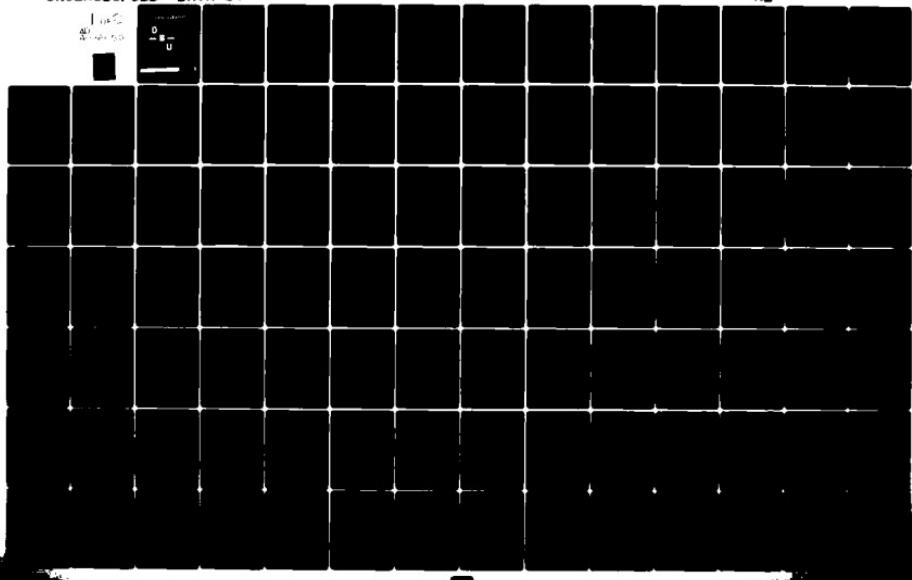


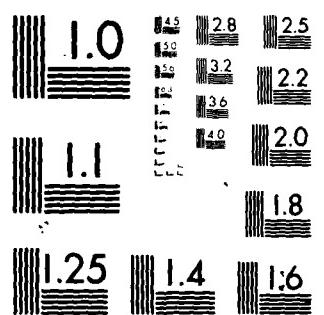
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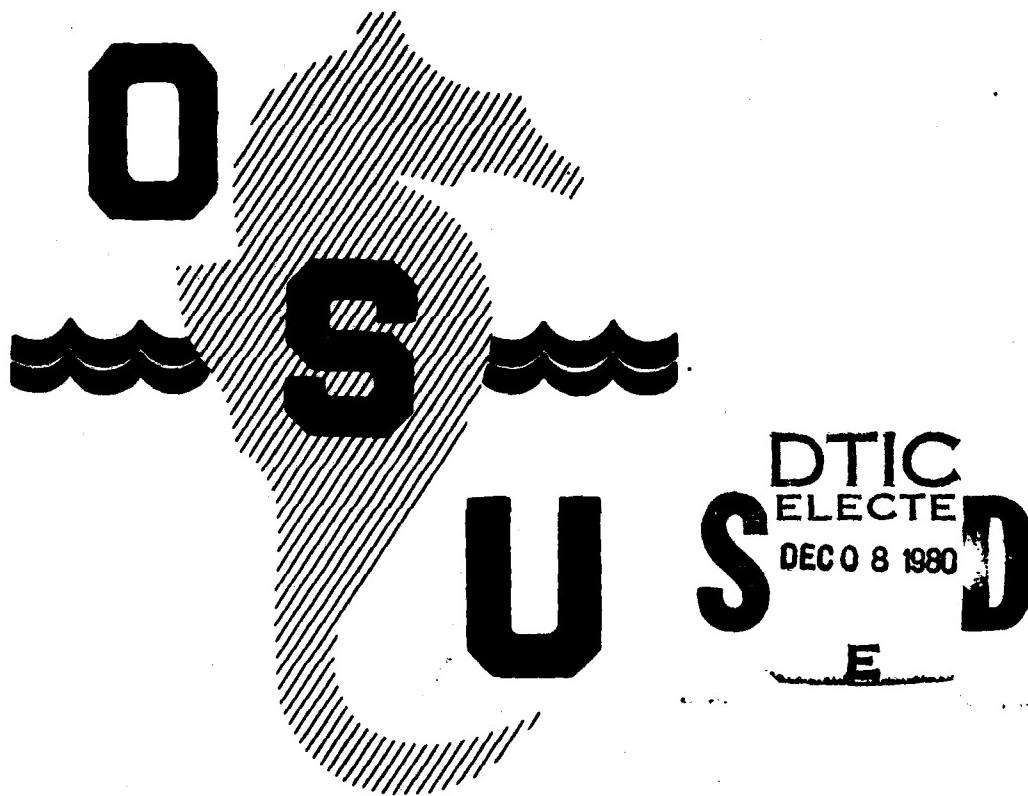
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Temperature Microstructure Profiles
From the Sub-Tropical Front

by
T. M. Dillon
and
D. R. Caldwell

Data Report 34 Reference 88-18
September 1988

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
1. REPORT NUMBER 80-16	2. GOVT ACCESSION NO. AD-A092650	3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) 6 TEMPERATURE MICROSTRUCTURE PROFILES FROM THE SUB-TROPICAL FRONT.	5. TYPE OF REPORT & PERIOD COVERED 9 Technical rept.		
7. AUTHOR(S) T.M. Dillon D.R. Caldwell	6. PERFORMING ORG. REPORT NUMBER 15 N00014-79-C-0004		
8. PERFORMING ORGANIZATION NAME AND ADDRESS School of Oceanography Oregon State University Corvallis, OR 97331	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR083-102		
11. CONTROLLING OFFICE NAME AND ADDRESS Office of Naval Research Ocean Science & Technology Division Arlington, Virginia 22217	12. REPORT DATE 11 September 1980		
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	13. NUMBER OF PAGES 121		
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; Distribution Unlimited	15. SECURITY CLASS. (of this report) Unclassified		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Approved for public release, distribution unlimited	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE		
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Sub-tropical front, microstructure, temperature profiles, kinetic energy dissipation rates			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Preliminary temperature microstructure profiles resulting from the FRONTS experiment in January 1980 are presented. Also included are selected profiles of the kinetic energy dissipation rate estimated by the Batchelor scale technique.	11 28 126		

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TEMPERATURE MICROSTRUCTURE PROFILES
FROM THE SUB-TROPICAL FRONT

by

T.M. Dillon and D.R. Caldwell

School of Oceanography
Oregon State University
Corvallis, Oregon 97331

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September, 1980

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ACKNOWLEDGEMENTS

The MSP instruments were constructed by S. Wilcox and J. Cantey. Participating in the cruise were J. Cantey, S. Blood, and R. Moore. S. Blood prepared the analysis software. Special thanks must be given to the officers and crew of the R/V OCEANOGRAPHER. This experiment was funded by the Office of Naval Research.

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INTRODUCTION

This report is a preliminary presentation of temperature microstructure data resulting from the FRONTS experiment in January 1980. During the experiment, four stations were occupied in the sub-tropical front area northeast of Hawaii; in addition, a transect of five stations was run across an active frontal area, and stations far north and far south of the frontal zone were occupied for comparison with the fronts area.

The Microstructure Profiler (MSP) has been described in the literature (Caldwell, Wilcox, and Matsler, 1975; Dillon and Caldwell, 1980a; Caldwell and Dillon, 1980; Dillon and Caldwell, 1980b). Pre- and Post-cruise calibrations of the thermistors agreed within 0.02°C . Two independent thermistors were used on each instrument, and the temperature measured by each agreed to within 0.02°C .

Temperatures were recorded with both a low gain and a high gain in the amplifiers. The low-gain thermistors had a resolution of 4 millidegrees, while the high-gain resolution was variable, and usually set at 0.16 millidegrees. The bulk of this report consists of plots of temperature depth-derivative, low-gain temperature, and high-gain temperature. Often, the high-gain temperature plots reveal much more structure, including small-scale inversions and instabilities, than is apparent in the low-gain temperatures.

Kinetic energy dissipation rates were estimated using the Batchelor scale or cut-off wavenumber technique (Dillon and Caldwell, 1980a; Caldwell and Dillon, 1980; Caldwell, Chriss, Newberger and Dillon, 1981). Selected profiles of the dissipation rate have been plotted in the last section of this report.

The low-gain temperature plots contain the vertical temperature derivative to the left in units of $^{\circ}\text{C}/\text{M}$. The temperature scale is at bottom and the depth in M is on the left. High-gain temperature profiles are limited to water above the seasonal thermocline (usually ~120m) because of dynamic range limitations. The points plotted are not averages, but instantaneous realizations which have been decimated so that the density of plotted points is of order 200 points per inch regardless of the vertical scale.

At the southernmost location, Station F8, the optical transmissivity over a 30cm horizontal path length was measured. Examples of the transmissivity profiles here have been plotted on an arbitrary scale, with "dirty" water to the left, and "clean" water to the right. Much less vertical variation was noted for this Station than has been observed at Ocean Station P or off the Oregon coast.

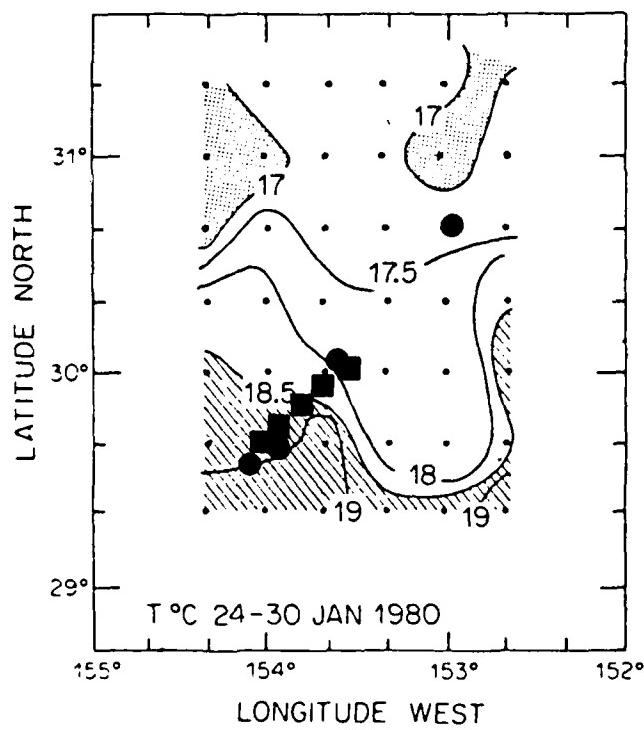
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- Dillon, T.M. and D.R. Caldwell (1980a). The Batchelor spectrum and dissipation in the upper ocean. J. Geophys. Res., 85 (C4), pp 1910-1916.
- Dillon, T.M. and D.R. Caldwell (1980b). High-frequency internal waves at Ocean Station P. J. Geophys. Res., 85 (C6), pp 3277-3284 (1980b).

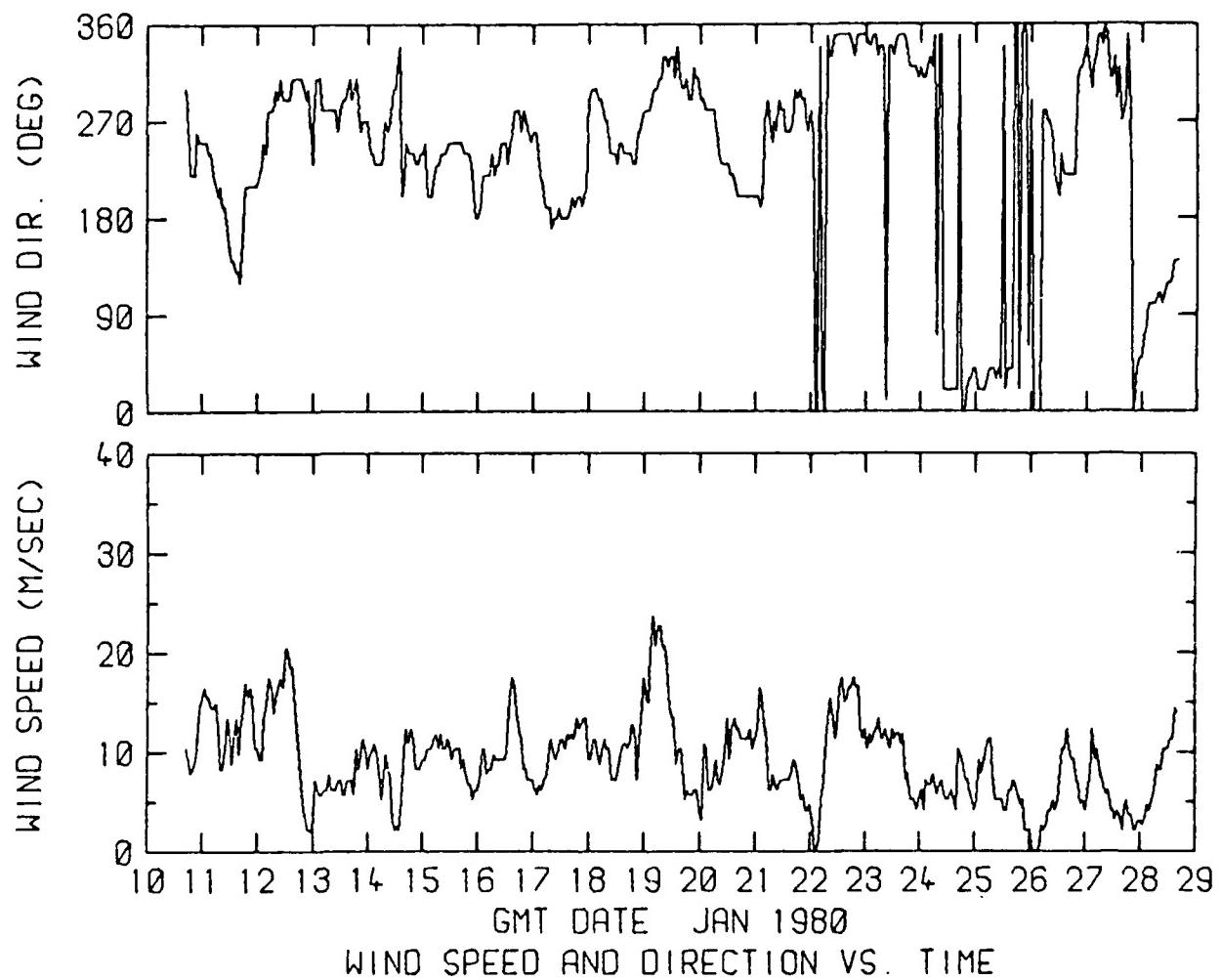
TABLE 1

**Latitude and Longitude of Microstructure Stations
Occupied by the NOAA Ship OCEANGORAPHER**

<u>Station No.</u>	<u>Latitude-Longitude</u>	<u>Date (Jan 80)/Time (CMT)</u>
F1	33°56'N-150°2'W	15/01:56-15/13:37
F2	31°00'N-153°00'W	23/18:13-24/04:12
F3	30°20.4'N-153°37.3'W	24/18:25-24/23:52
F5 (transect)	30°20.9'N-153°36.2'W	25/18:35-25/19:30
	30°16.1'N-153°42.6'W	25/20:40-25/21:01
	30°10.1'N-152°49.8'W	25/23:00-26/00:02
	30°01.6'N-153°57.2'W	26/00:54-26/02:58
	29°59.5'N-154°00.6'W	26/03:51-26/05:18
F6	29°58.5'N-154°00.3'W	26/18:35-27/00:21
F7	29°52.5'N-154°06.9'W	27/02:12-27/08:13
F8	26°05.8'N-155°45.1 W	28/19:58-29/02:45



Map of the most intensively studied region, along a line extending to the southwest from 31°N-153°W, overlayed on a preliminary map of sea-surface temperature kindly supplied by Gunnar Roden. Large dark circles are stations occupied for many casts, and large dark squares are transect stations occupied only briefly.

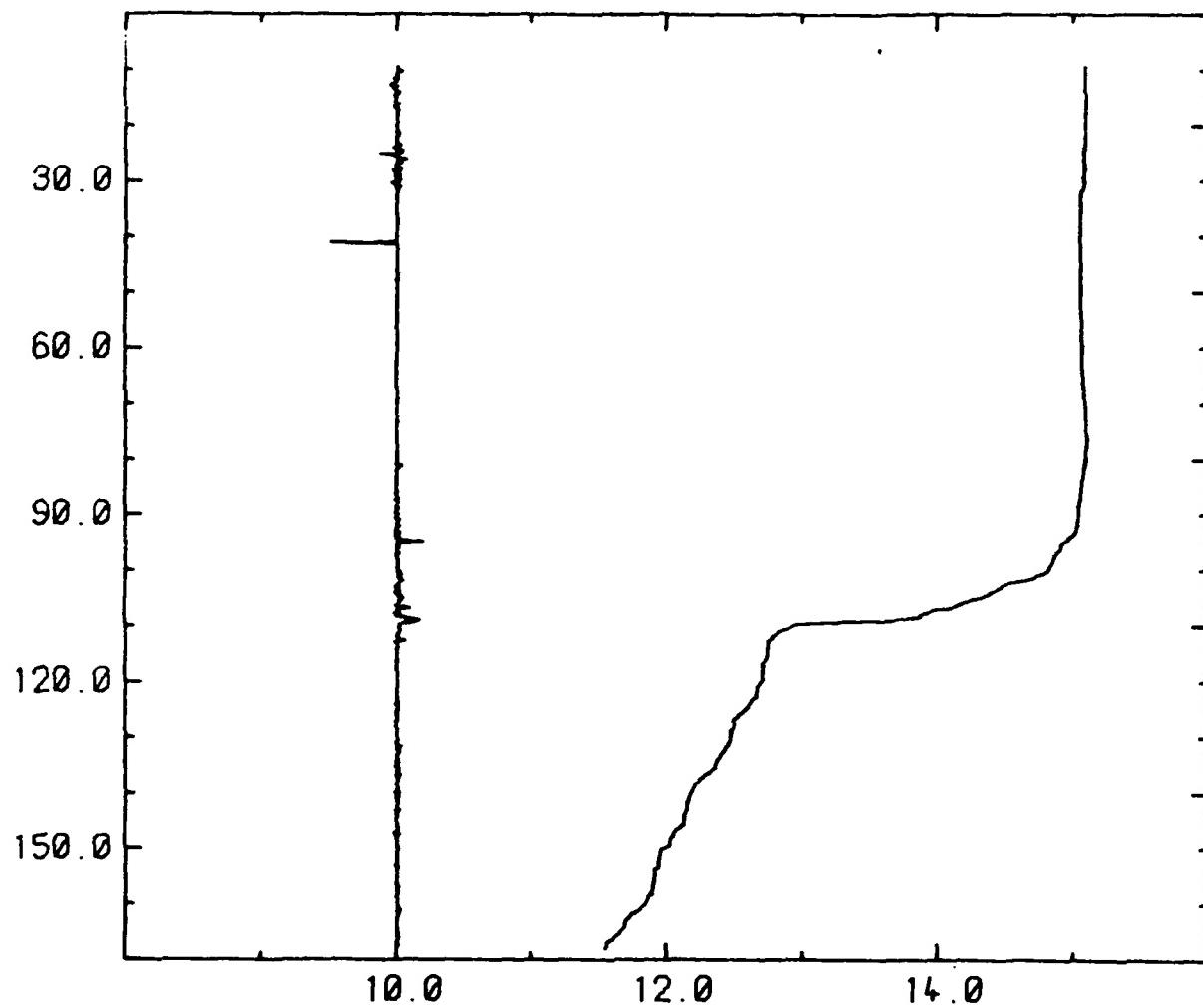


Wind speed and direction as measured aboard the R/V OCEANOGRAPHER during the FRONTS experiment; correction for ship motion has been included. (Plot courtesy of C. Paulson.)

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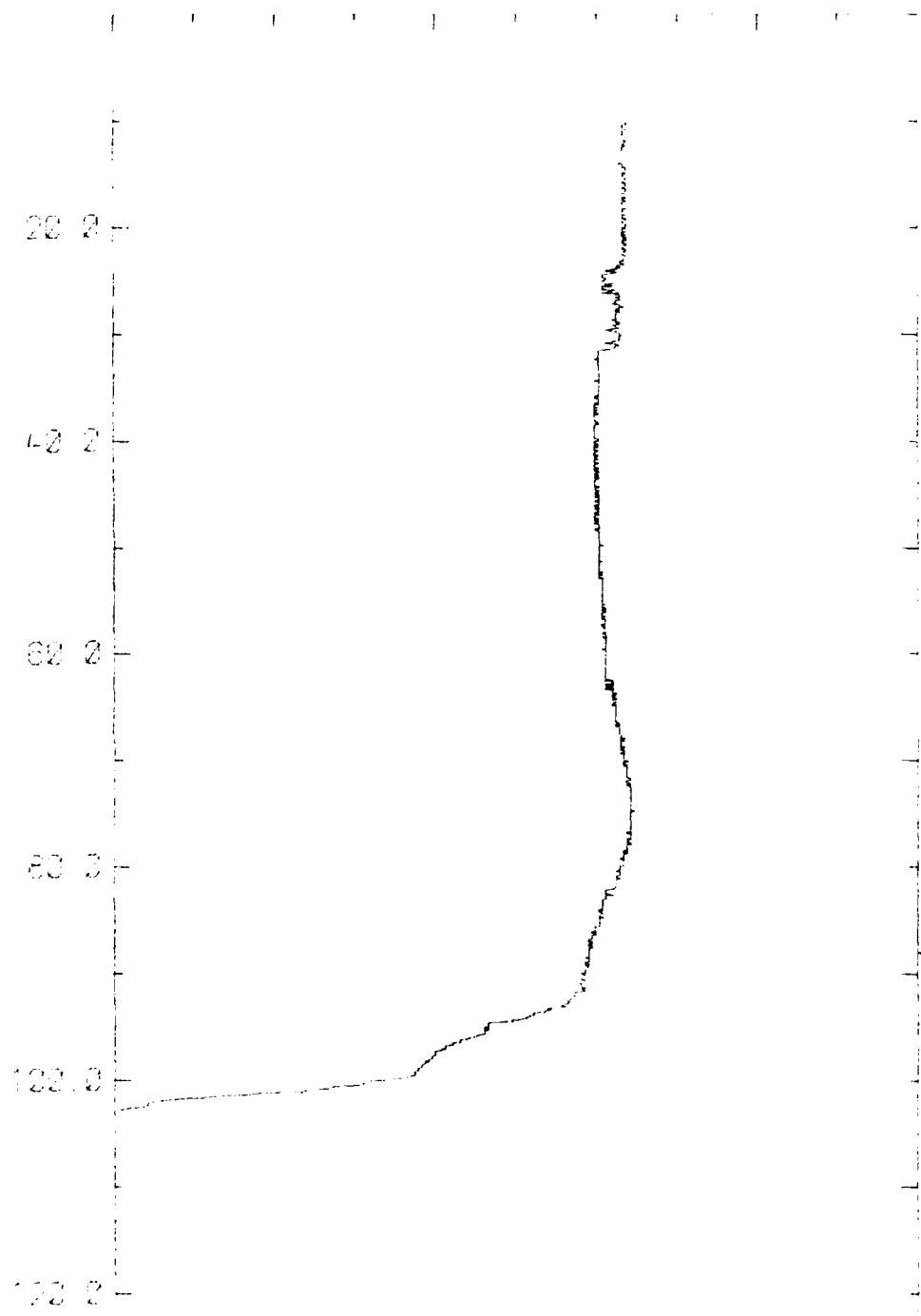
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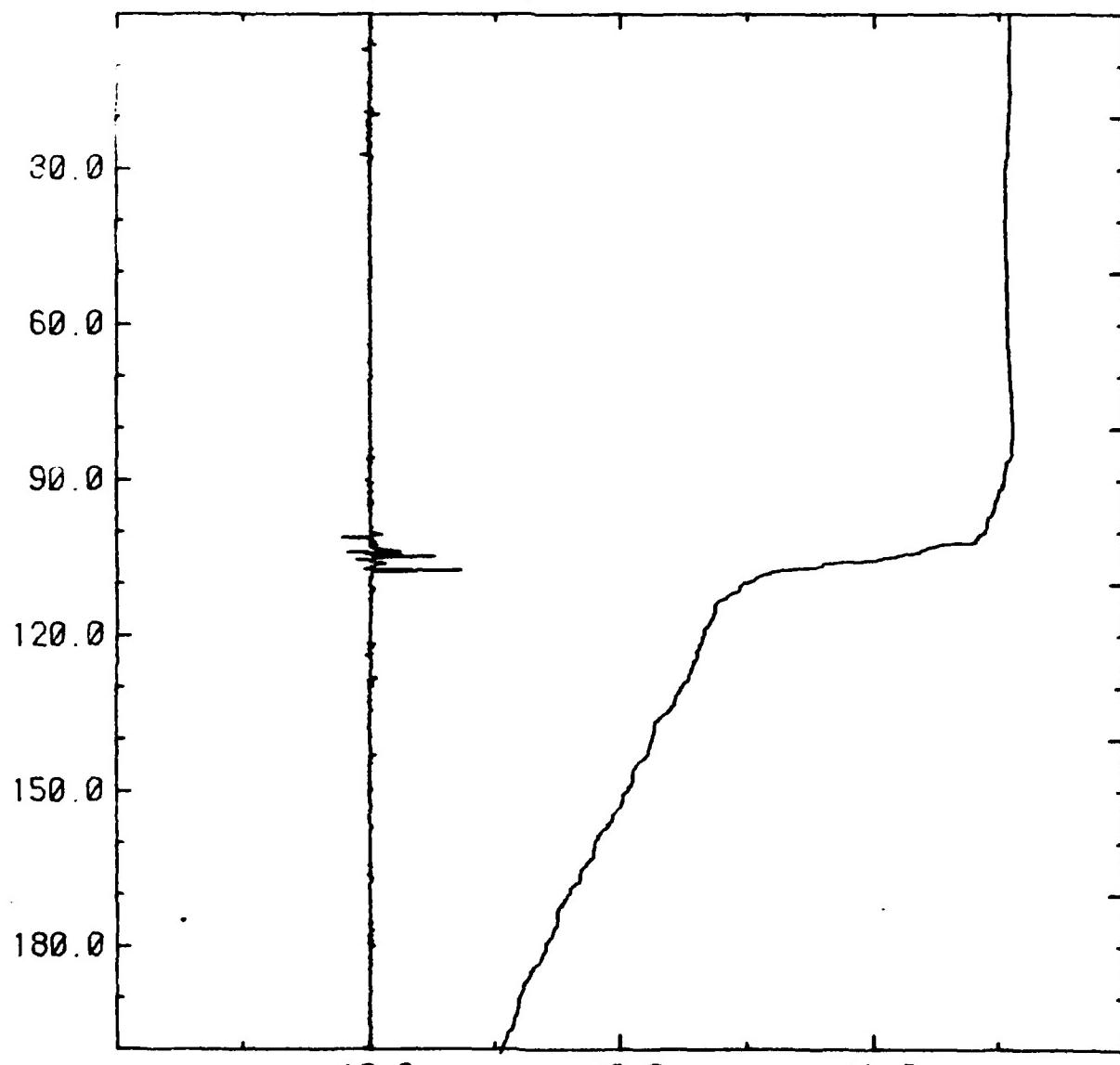
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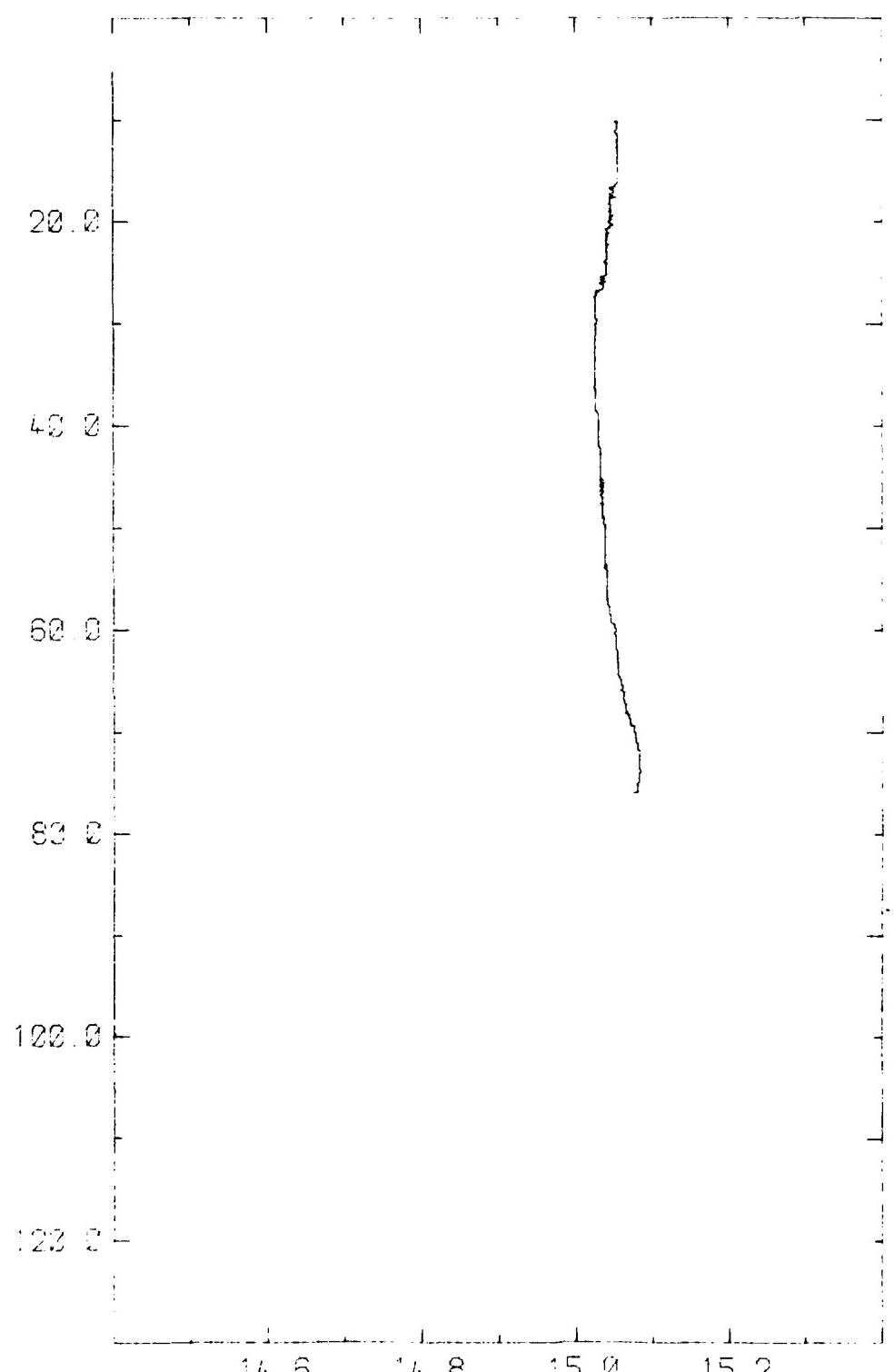
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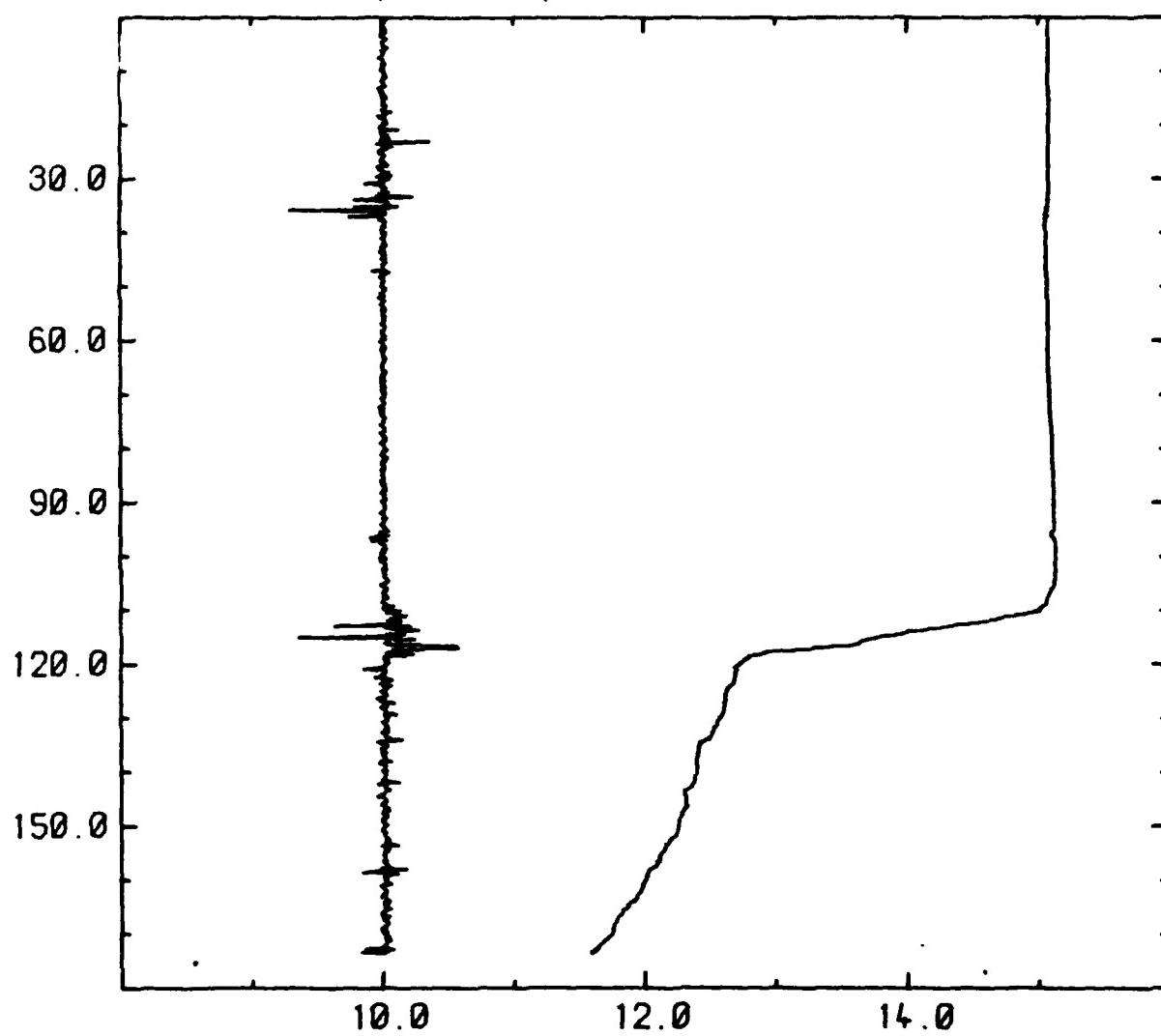


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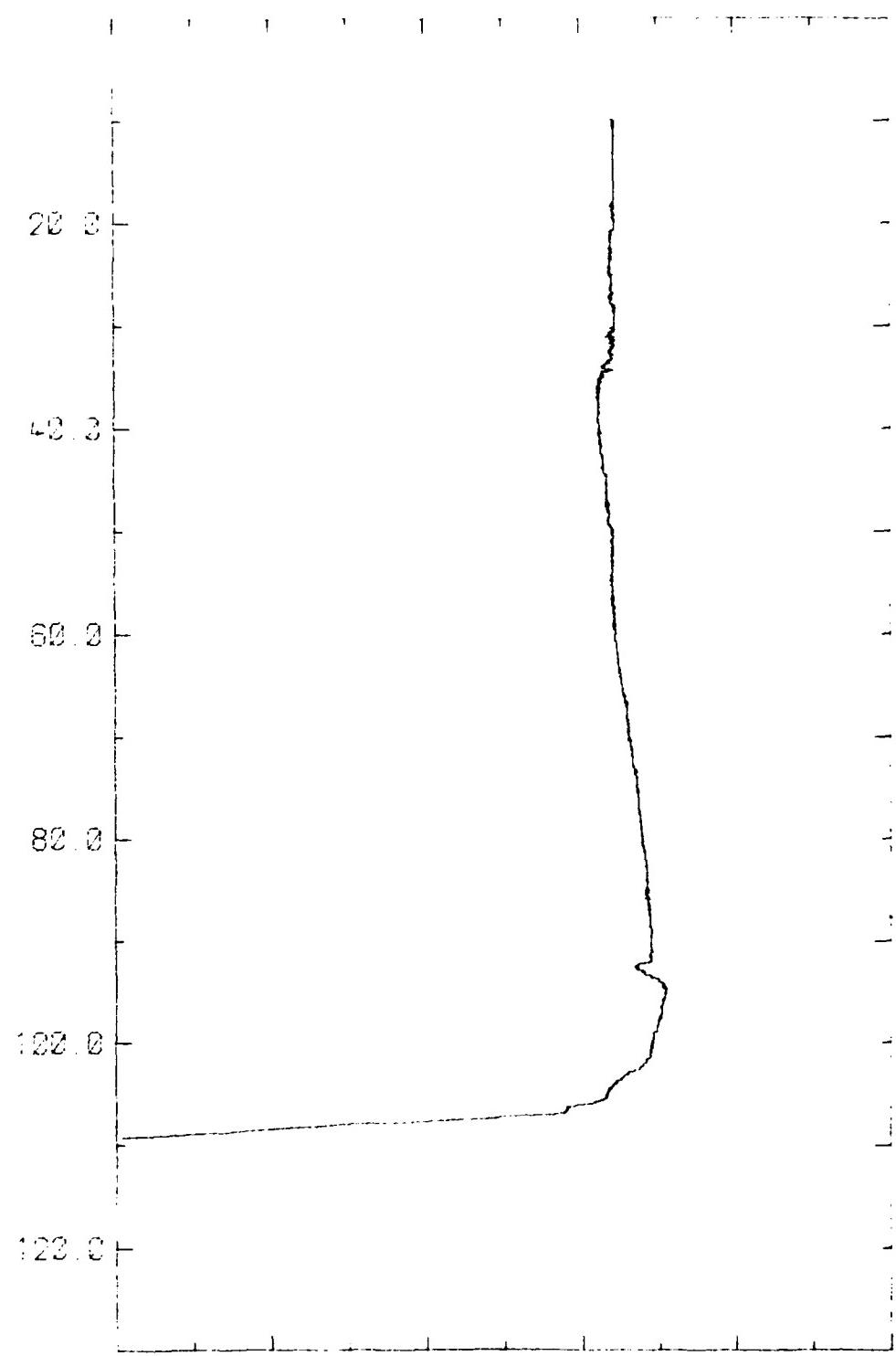


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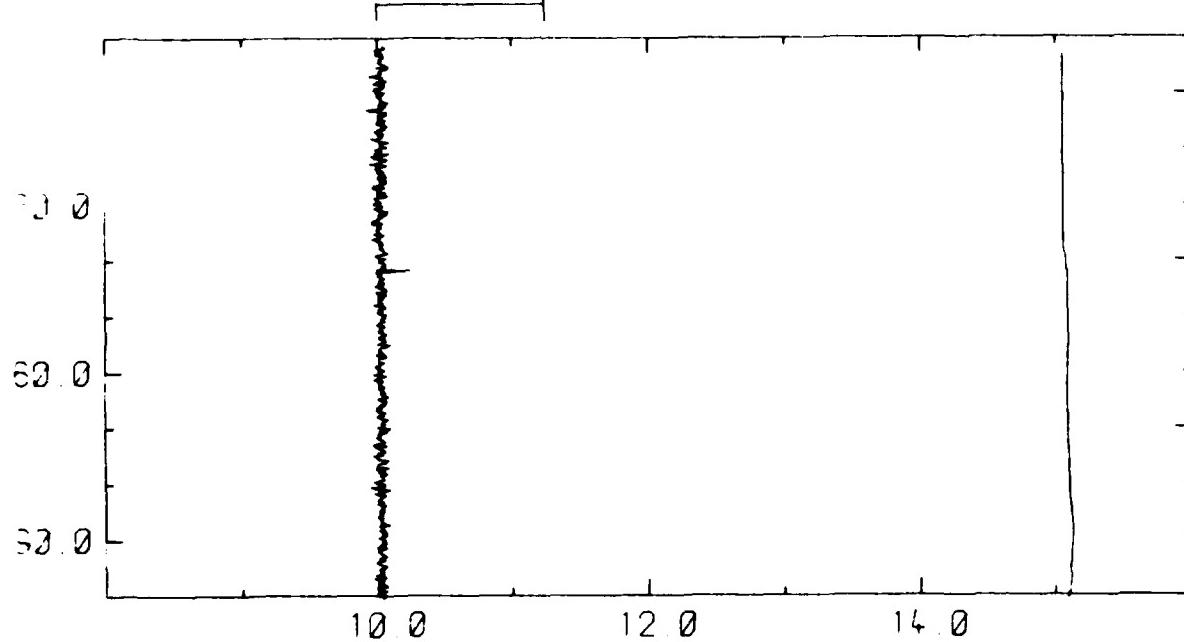


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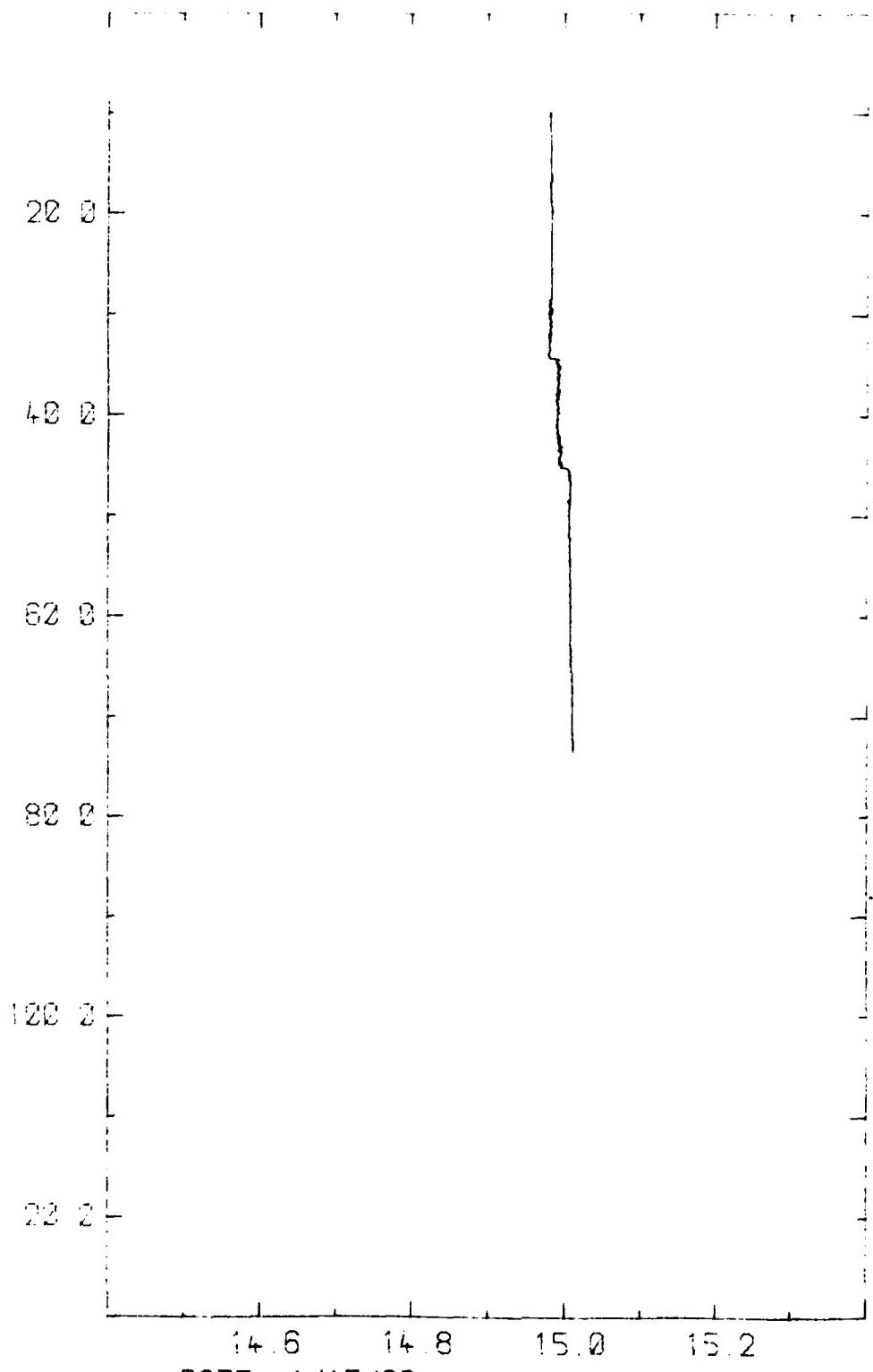
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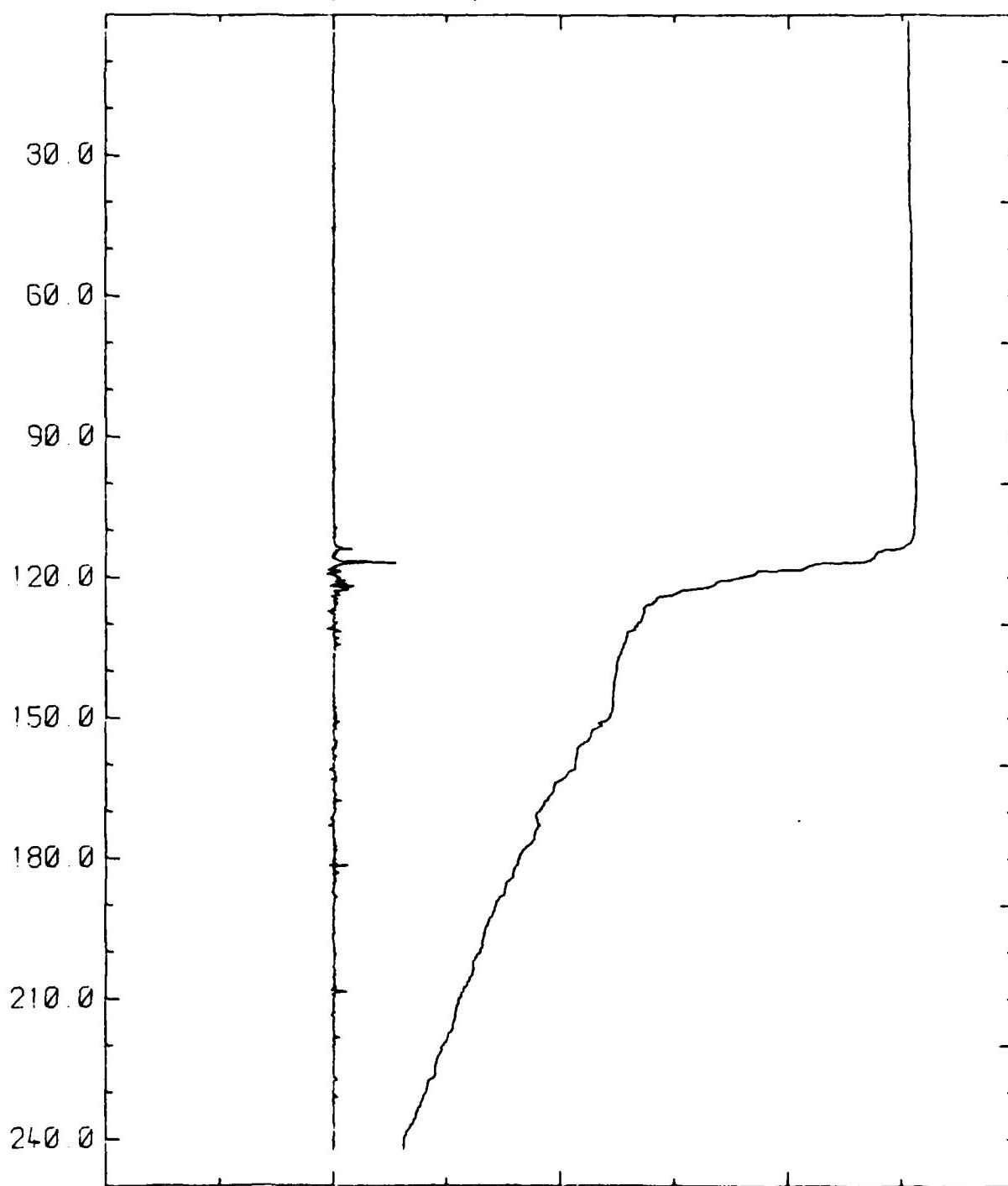
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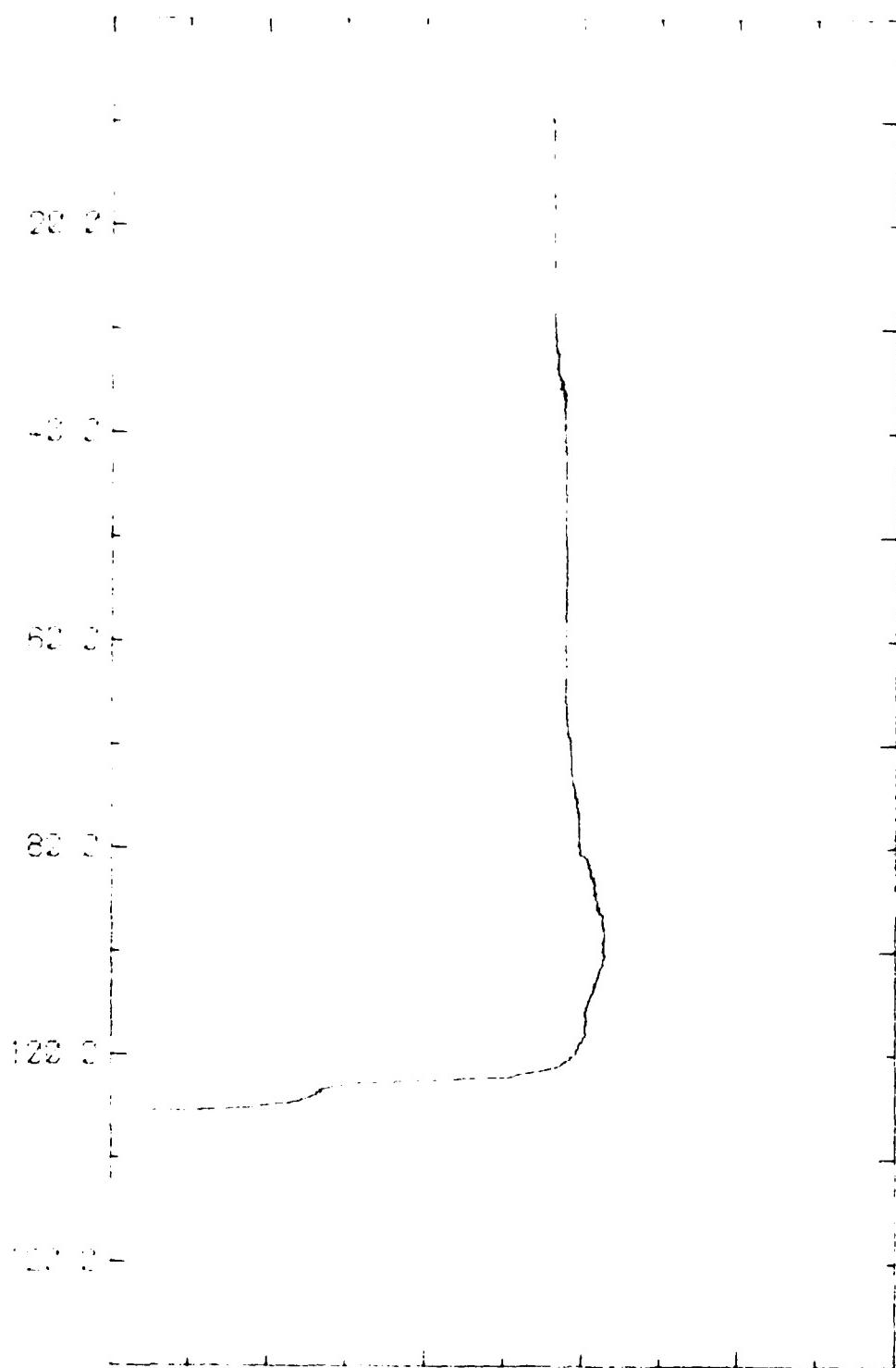
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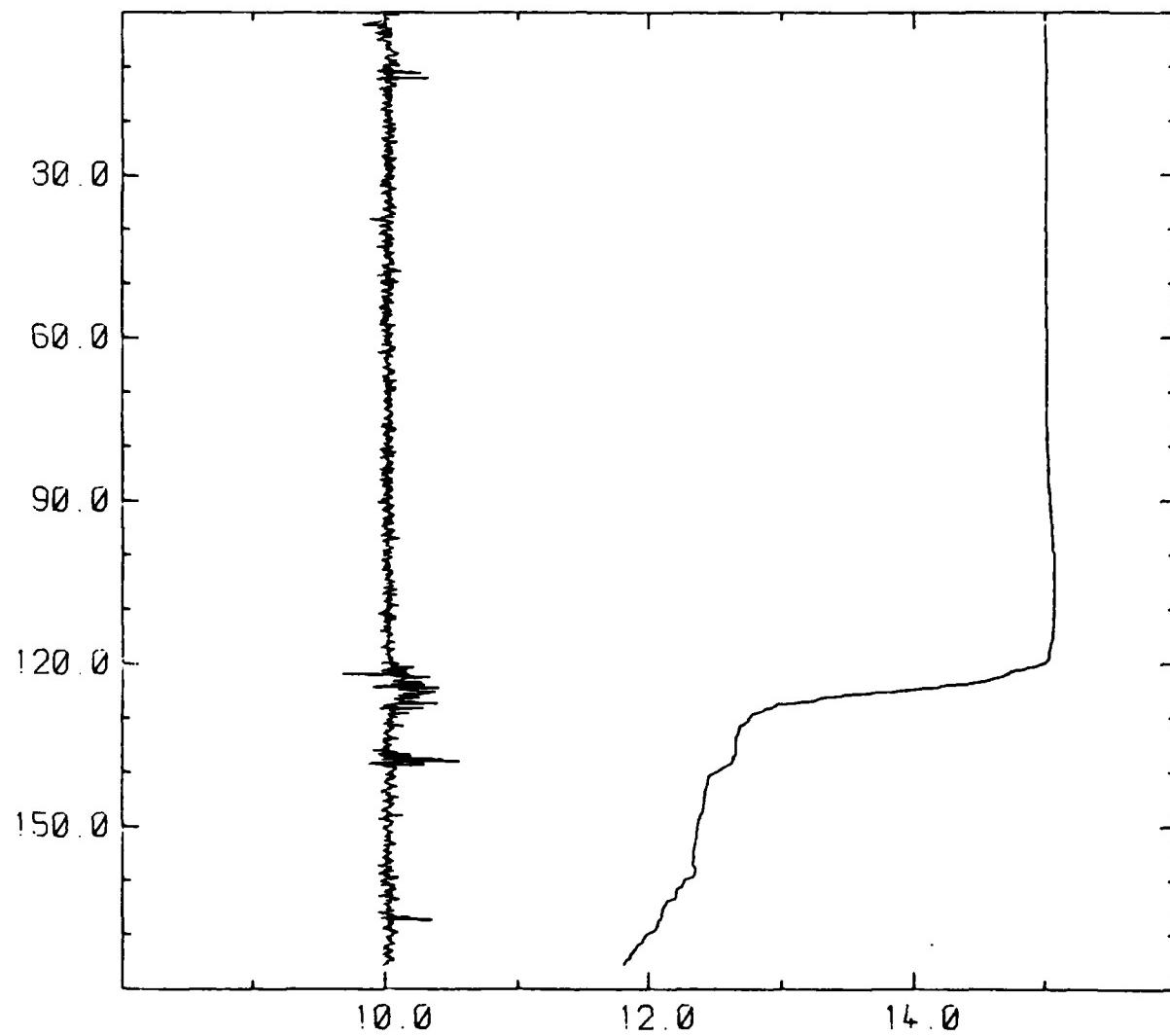
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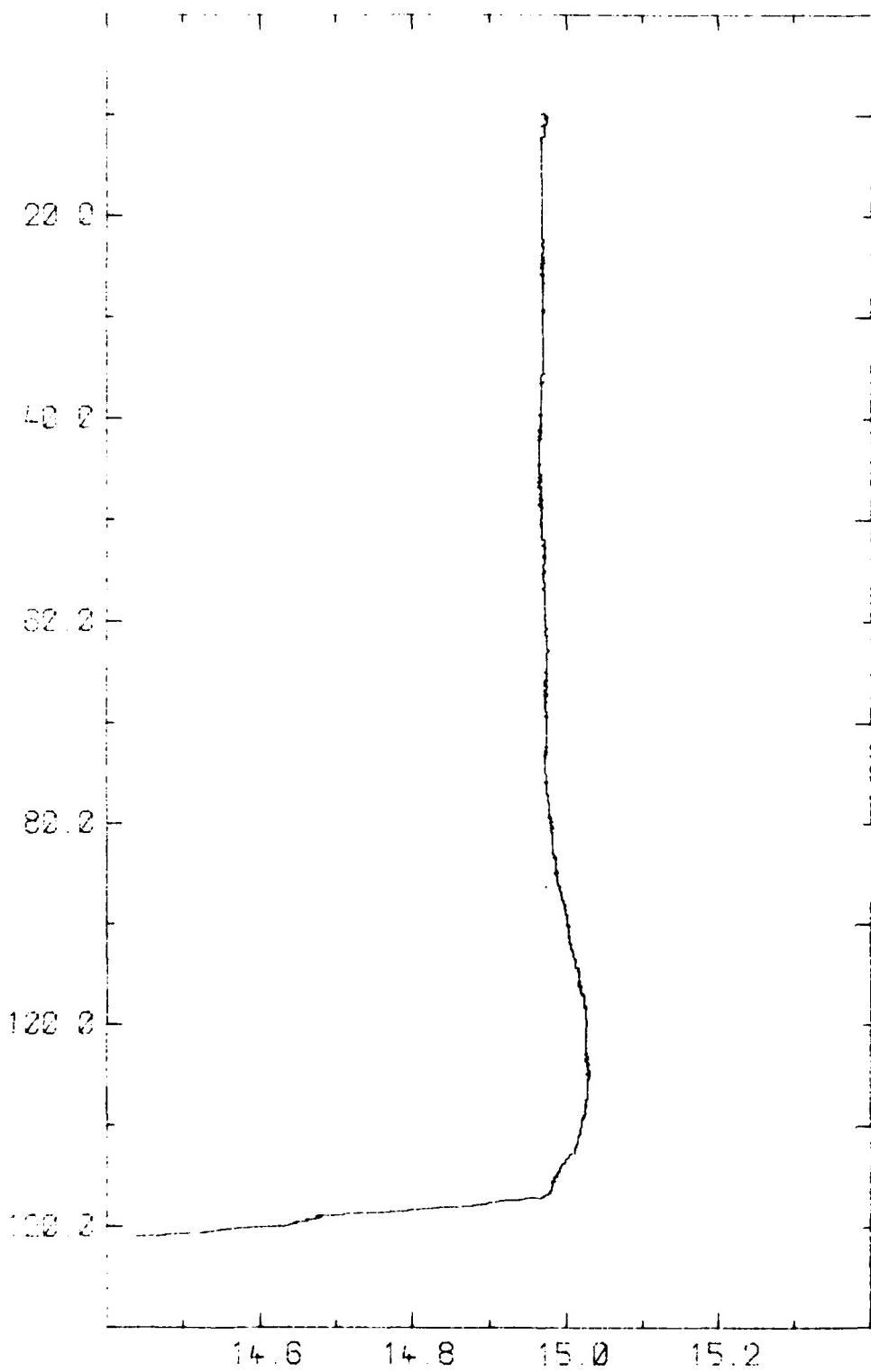
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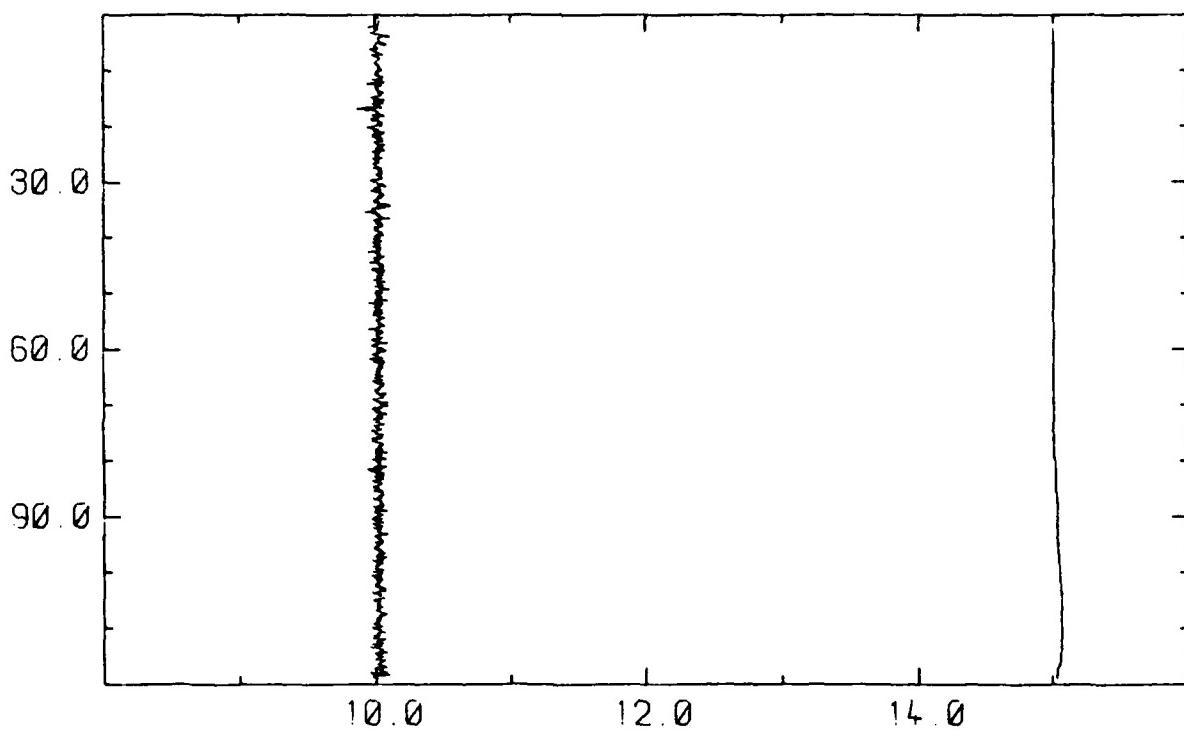
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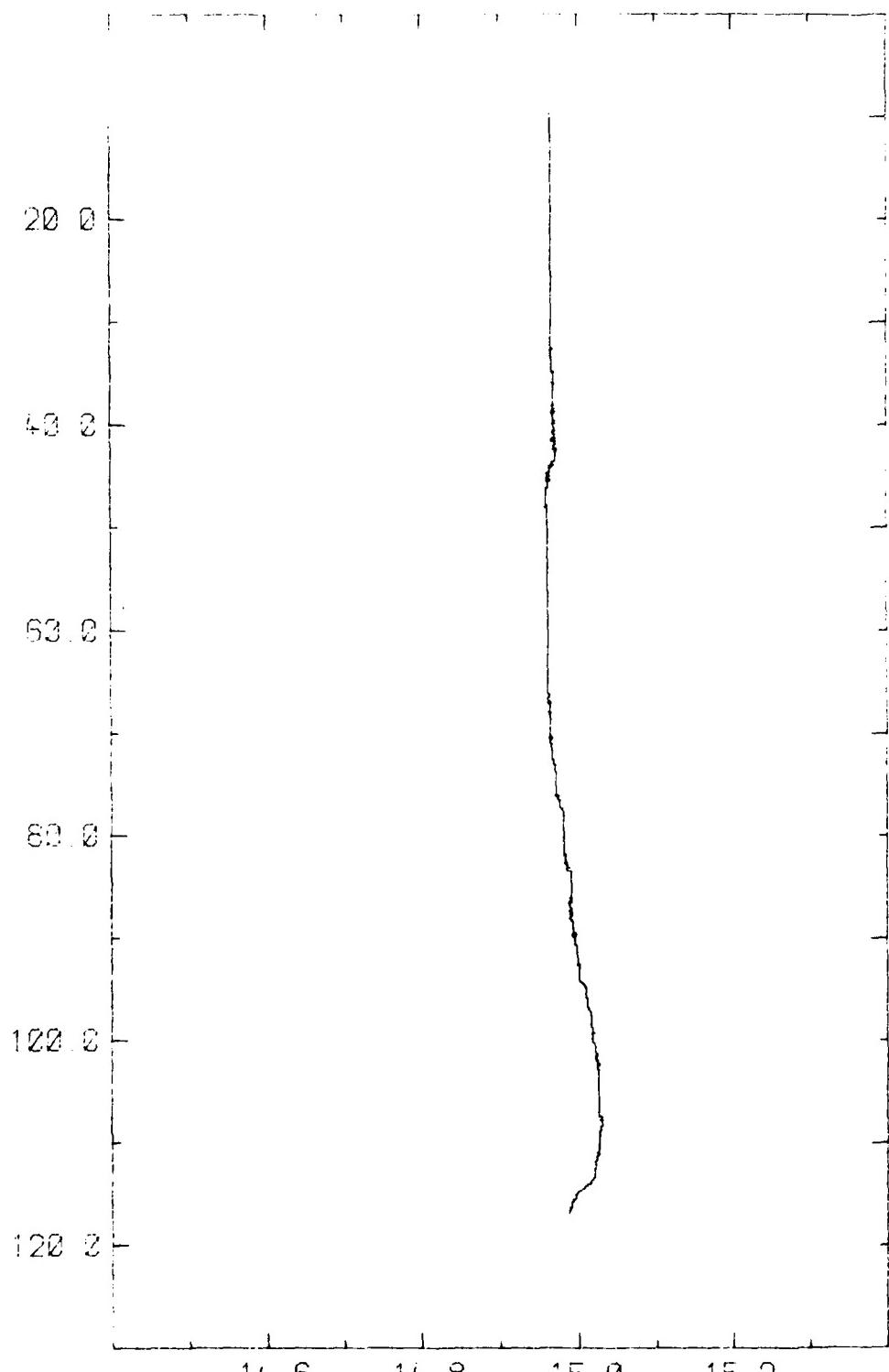
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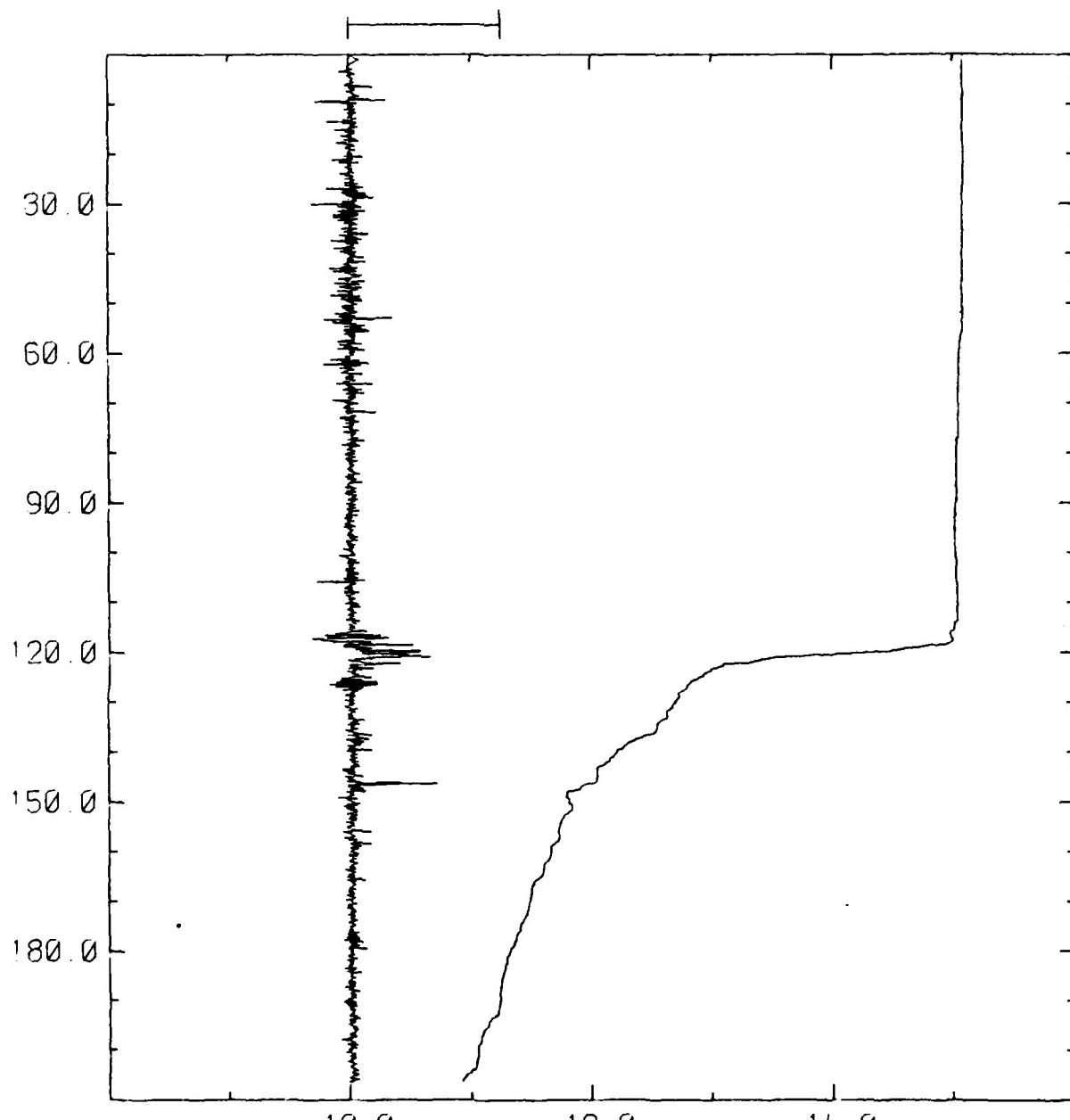


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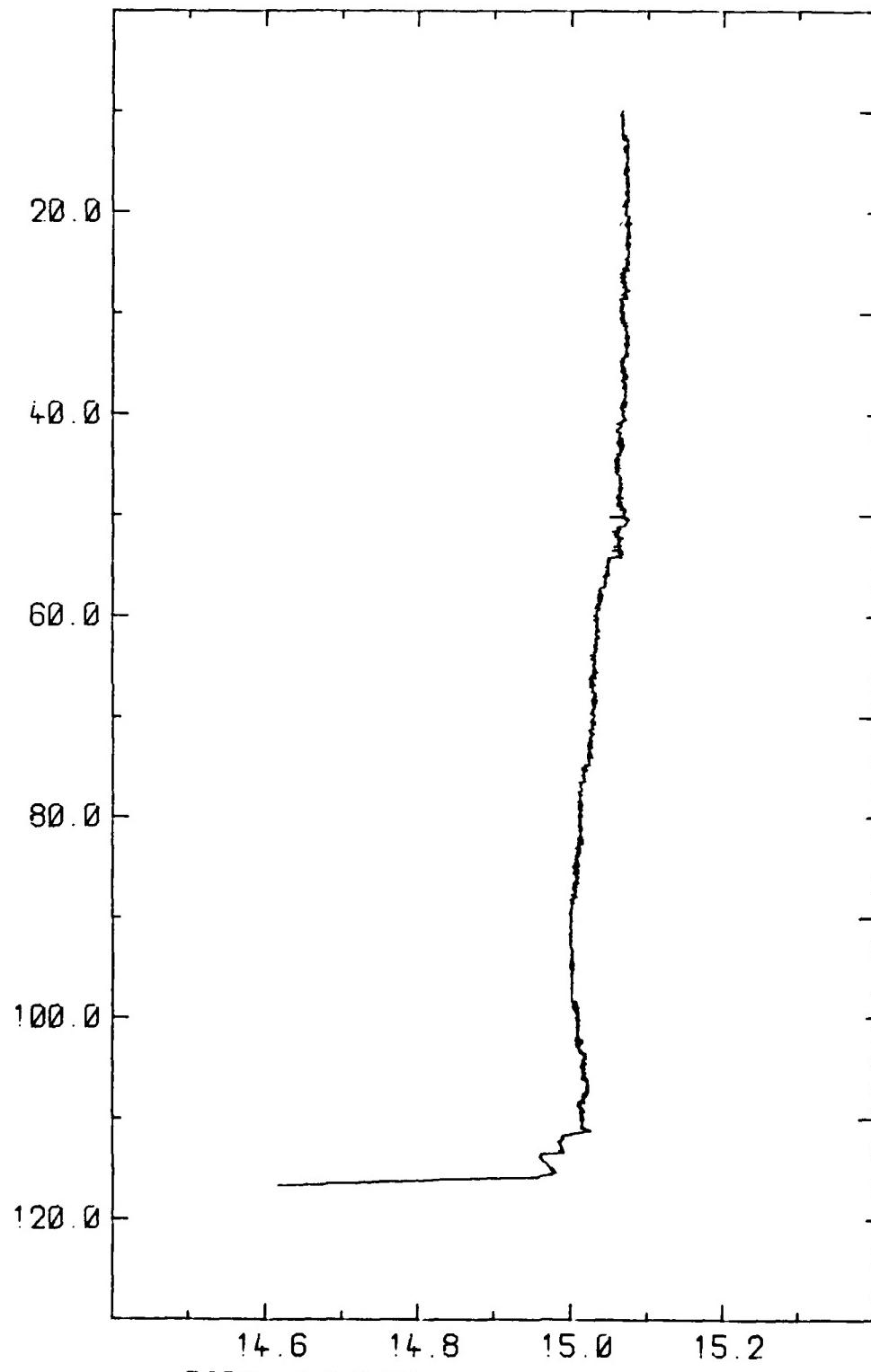
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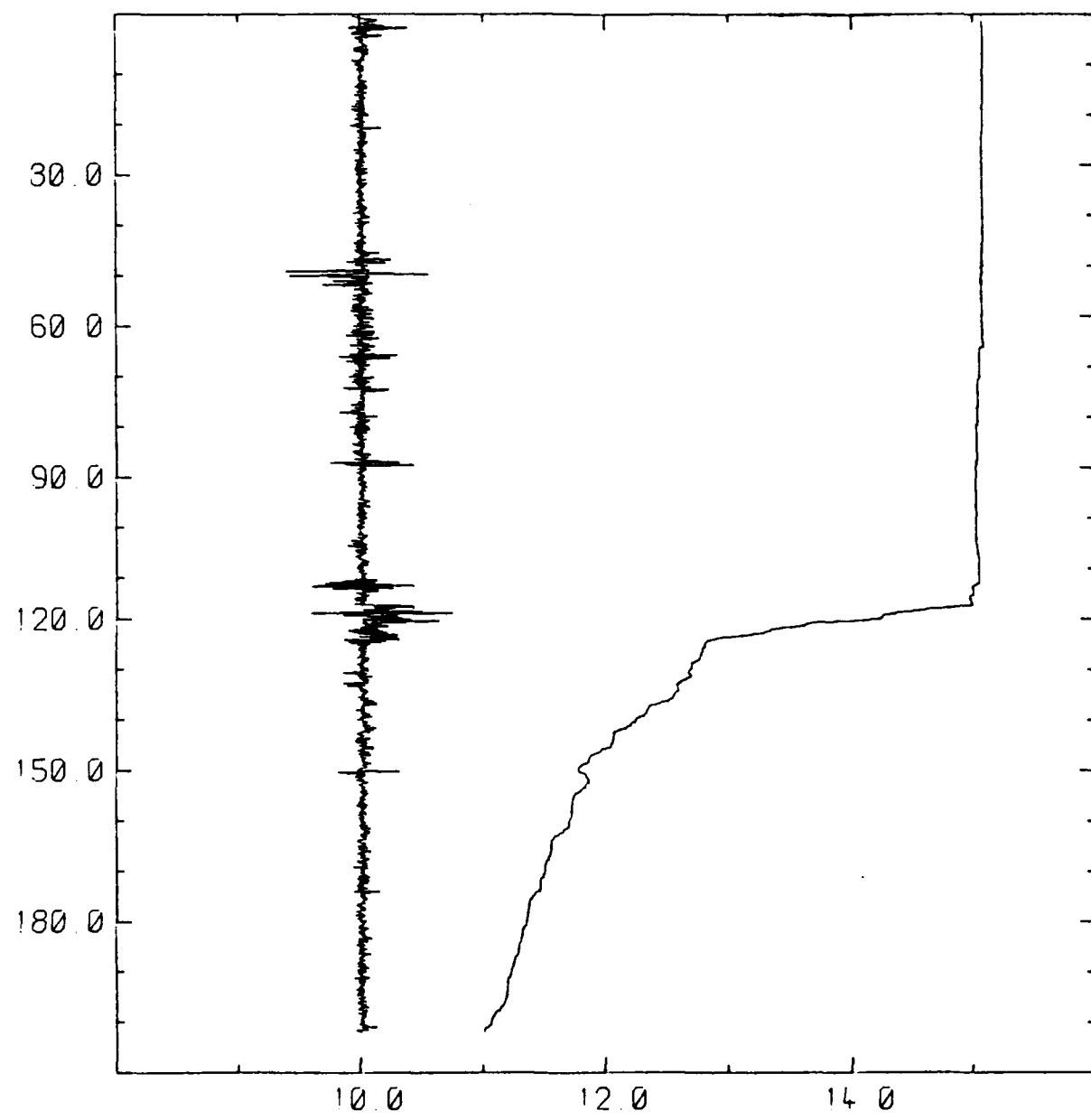


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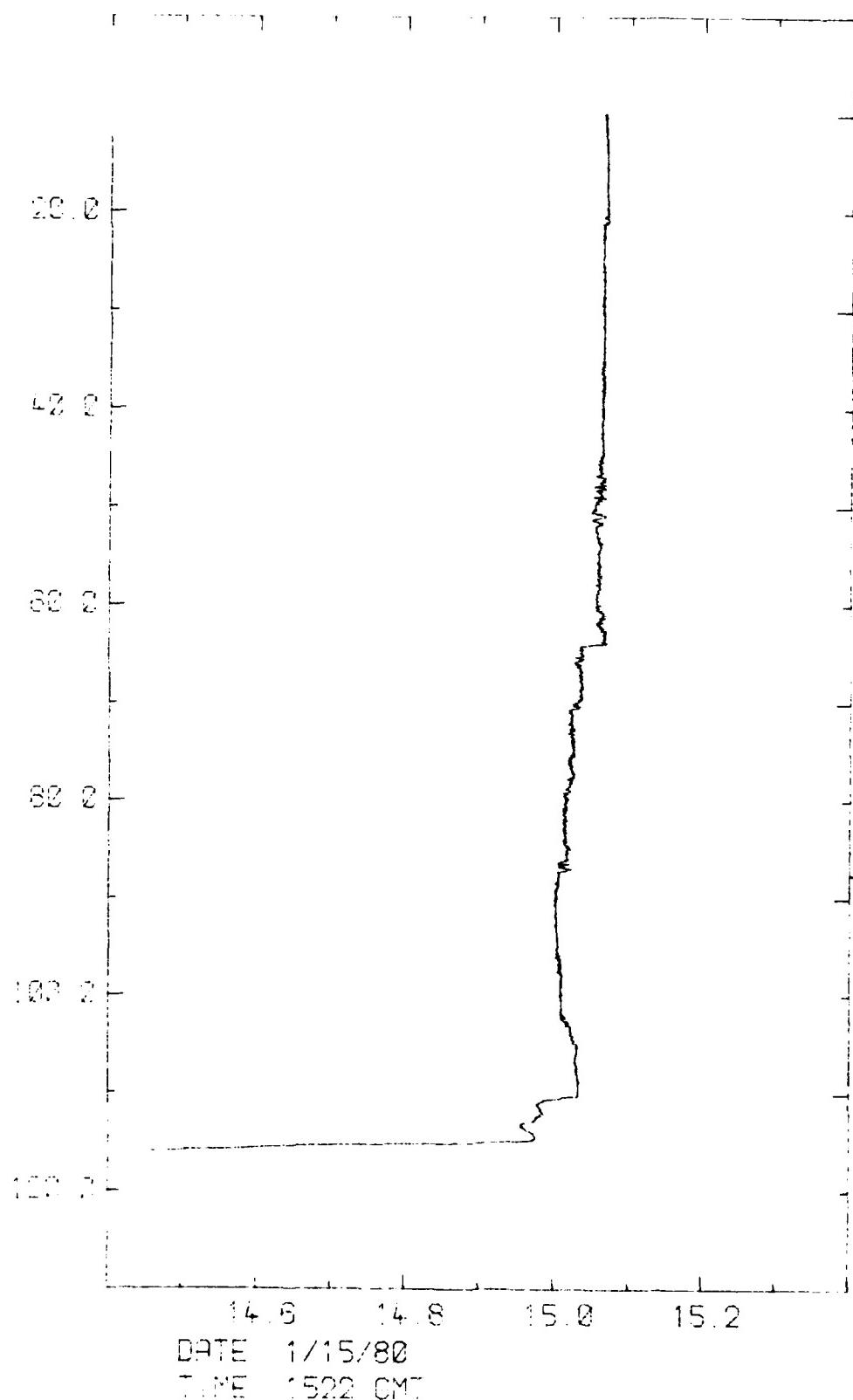
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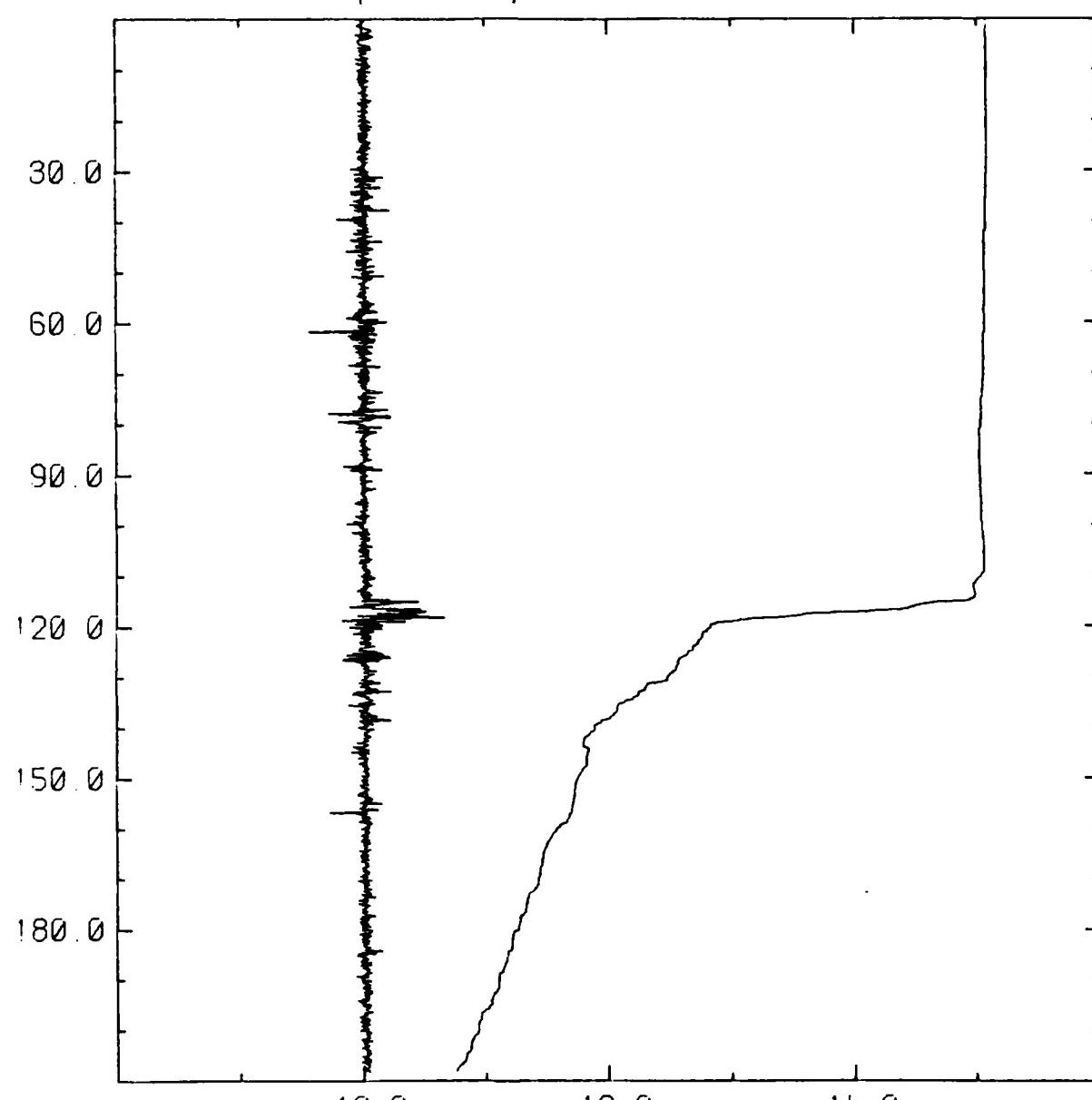
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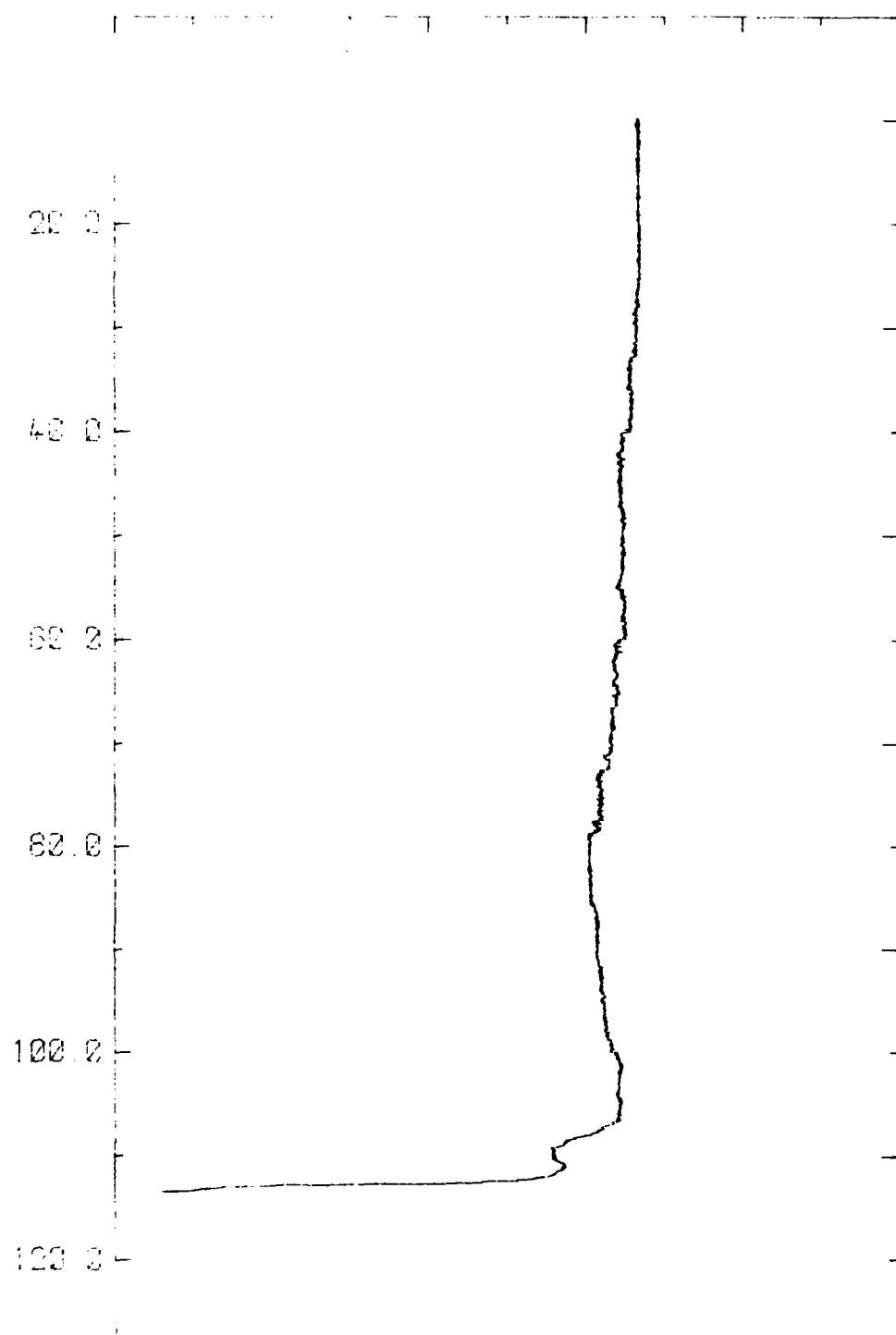
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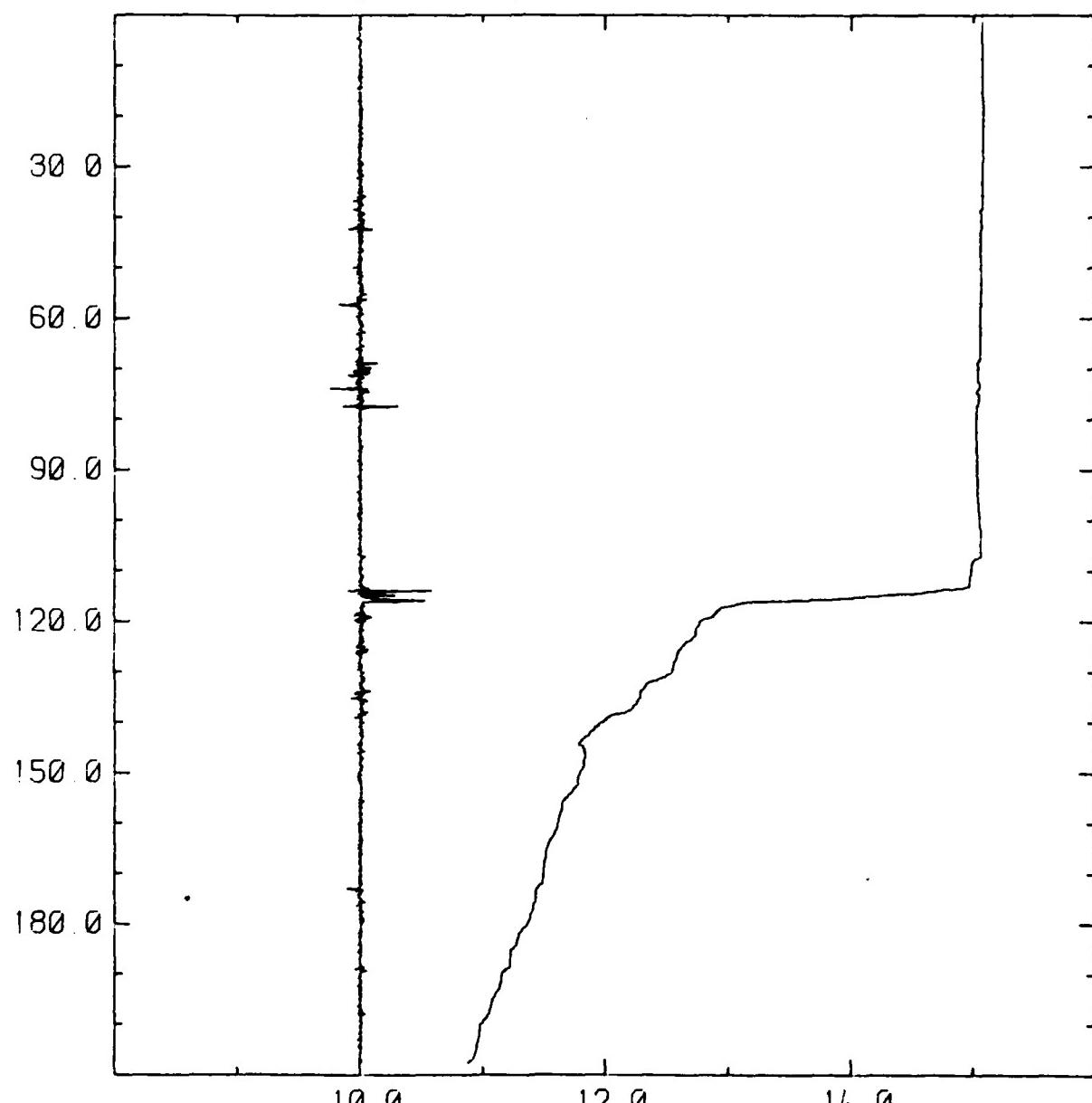
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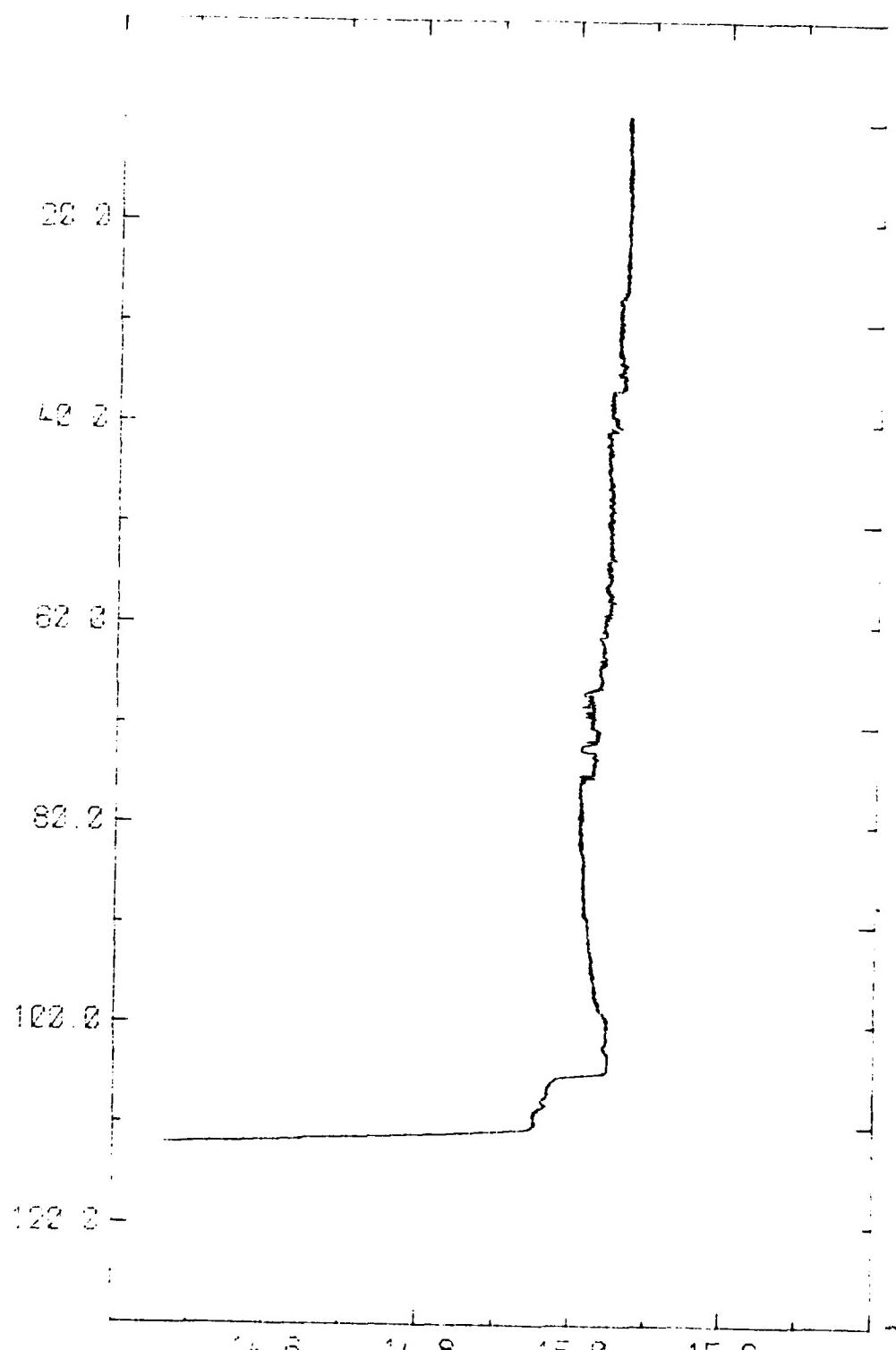
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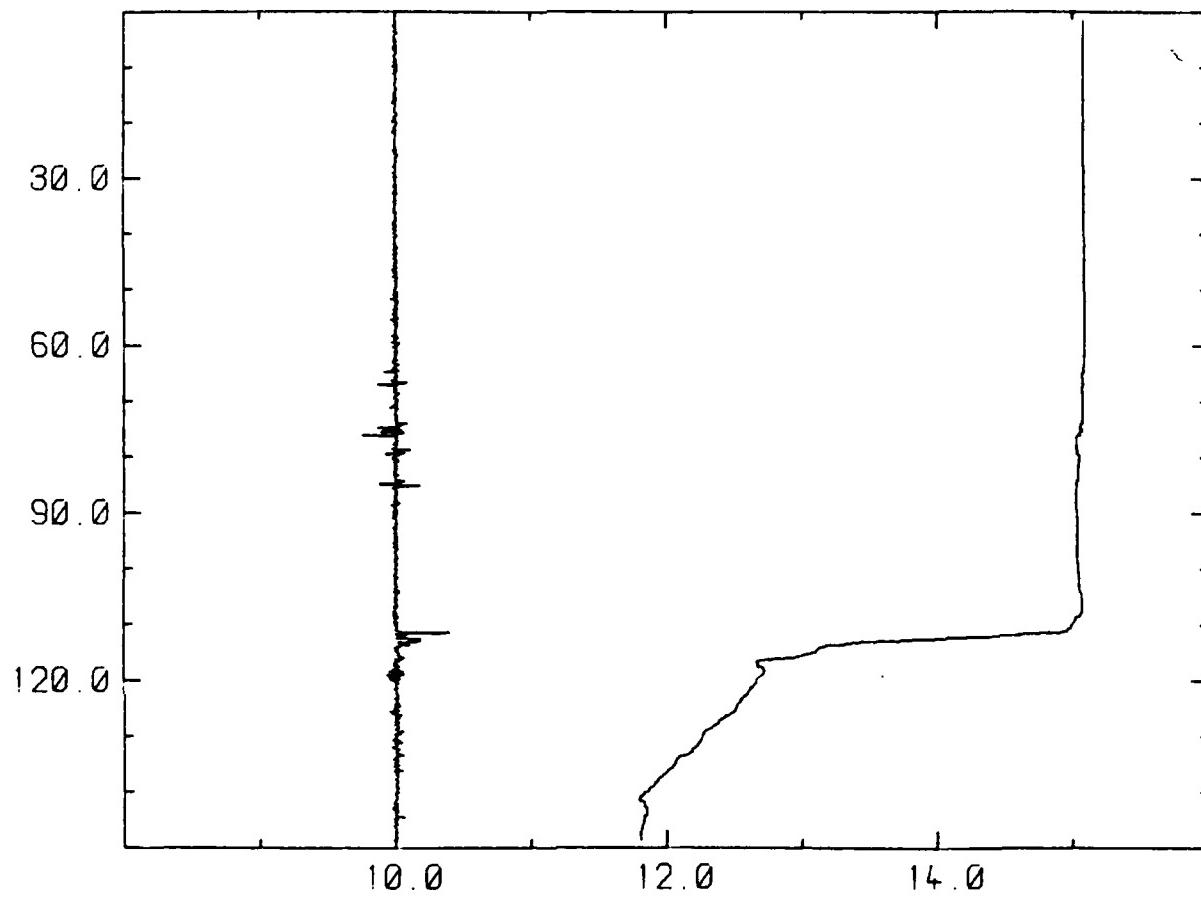
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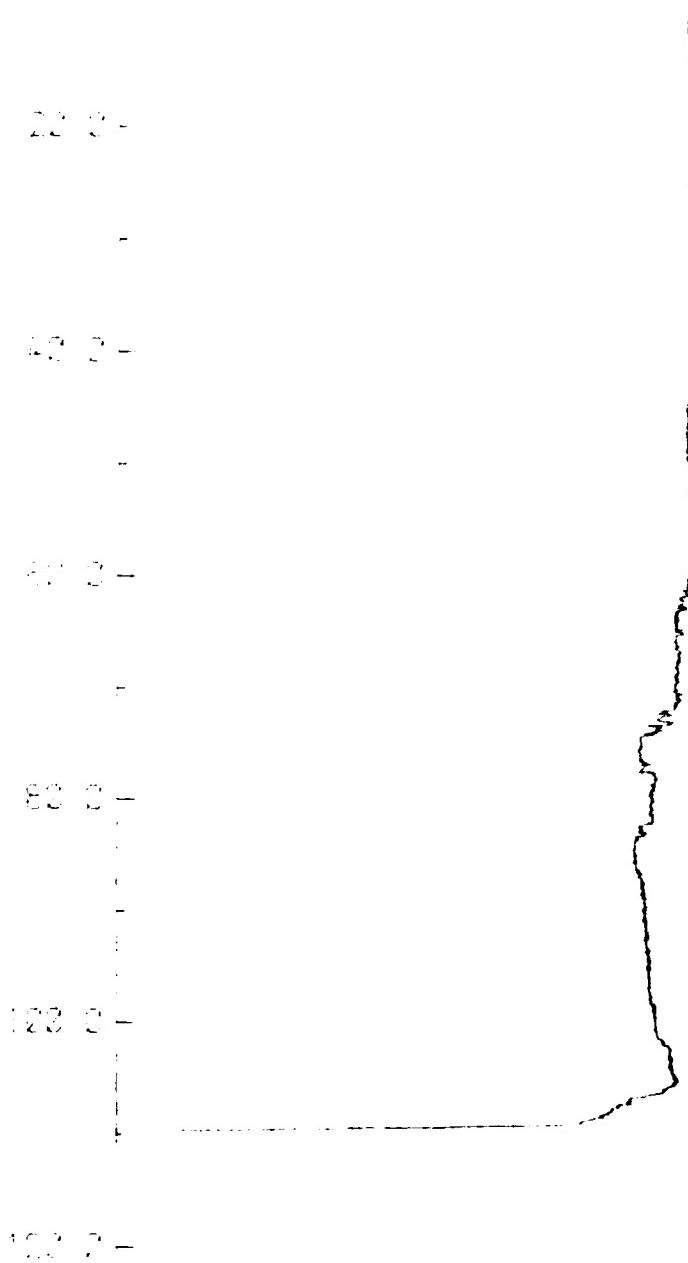
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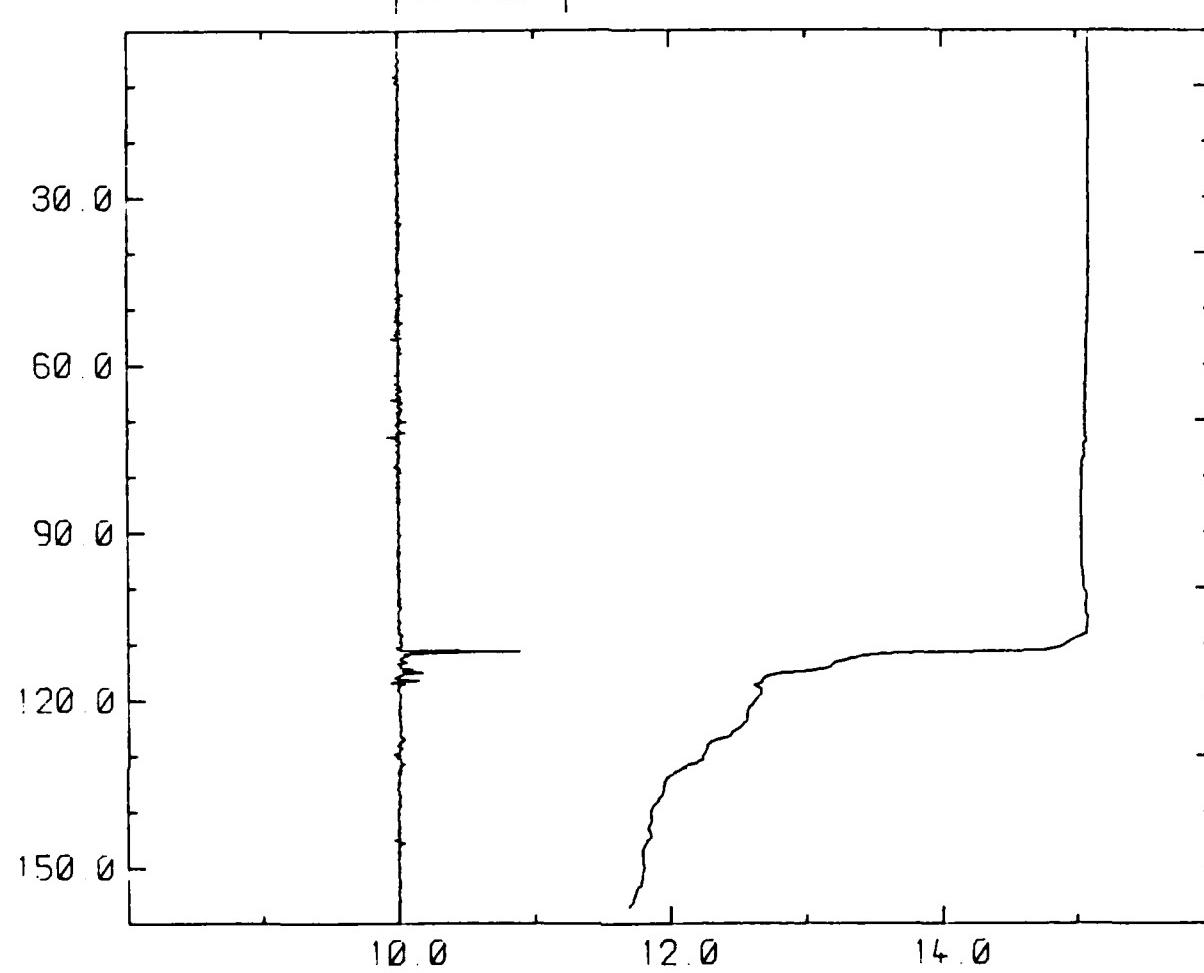
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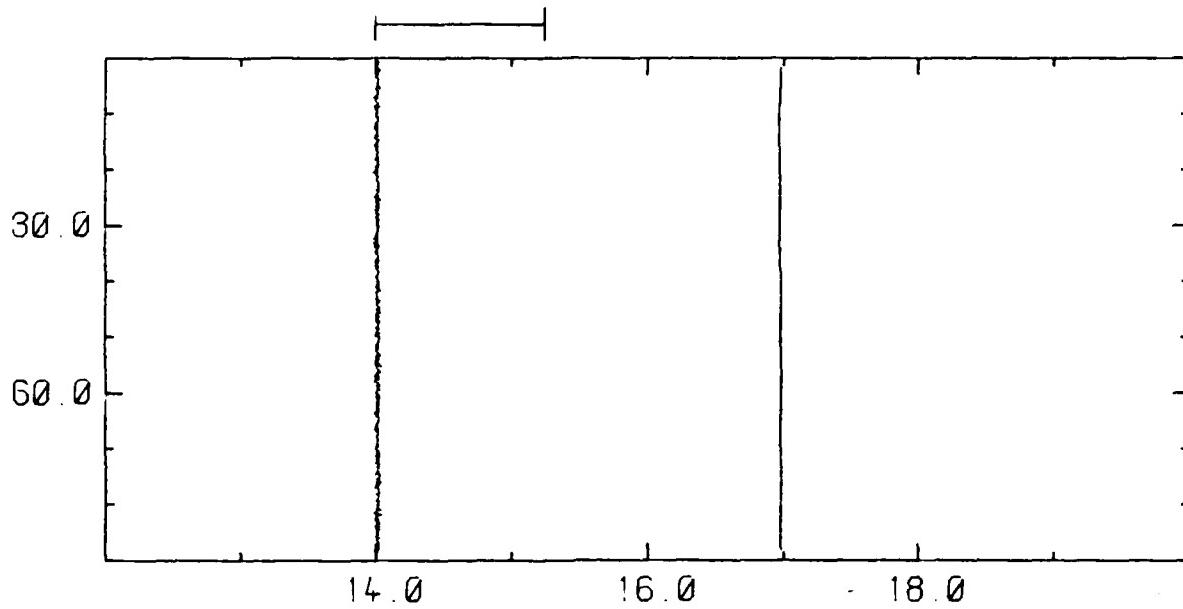
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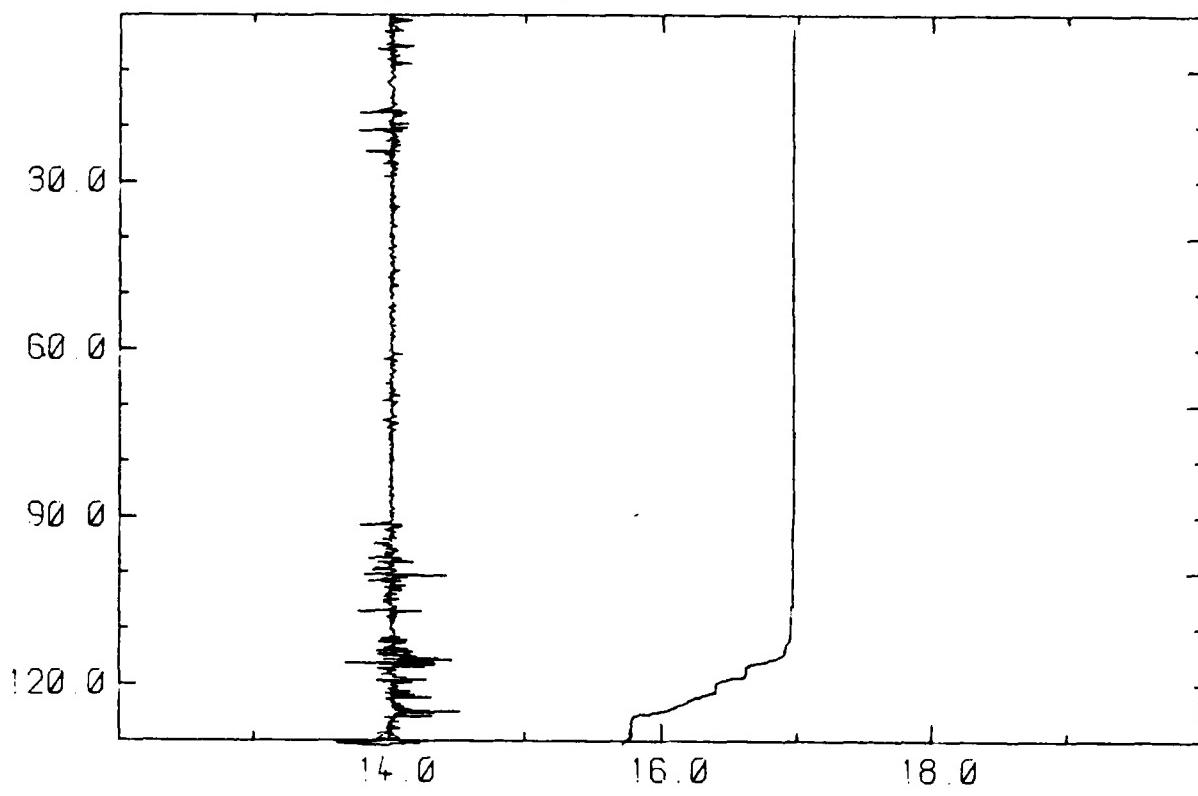
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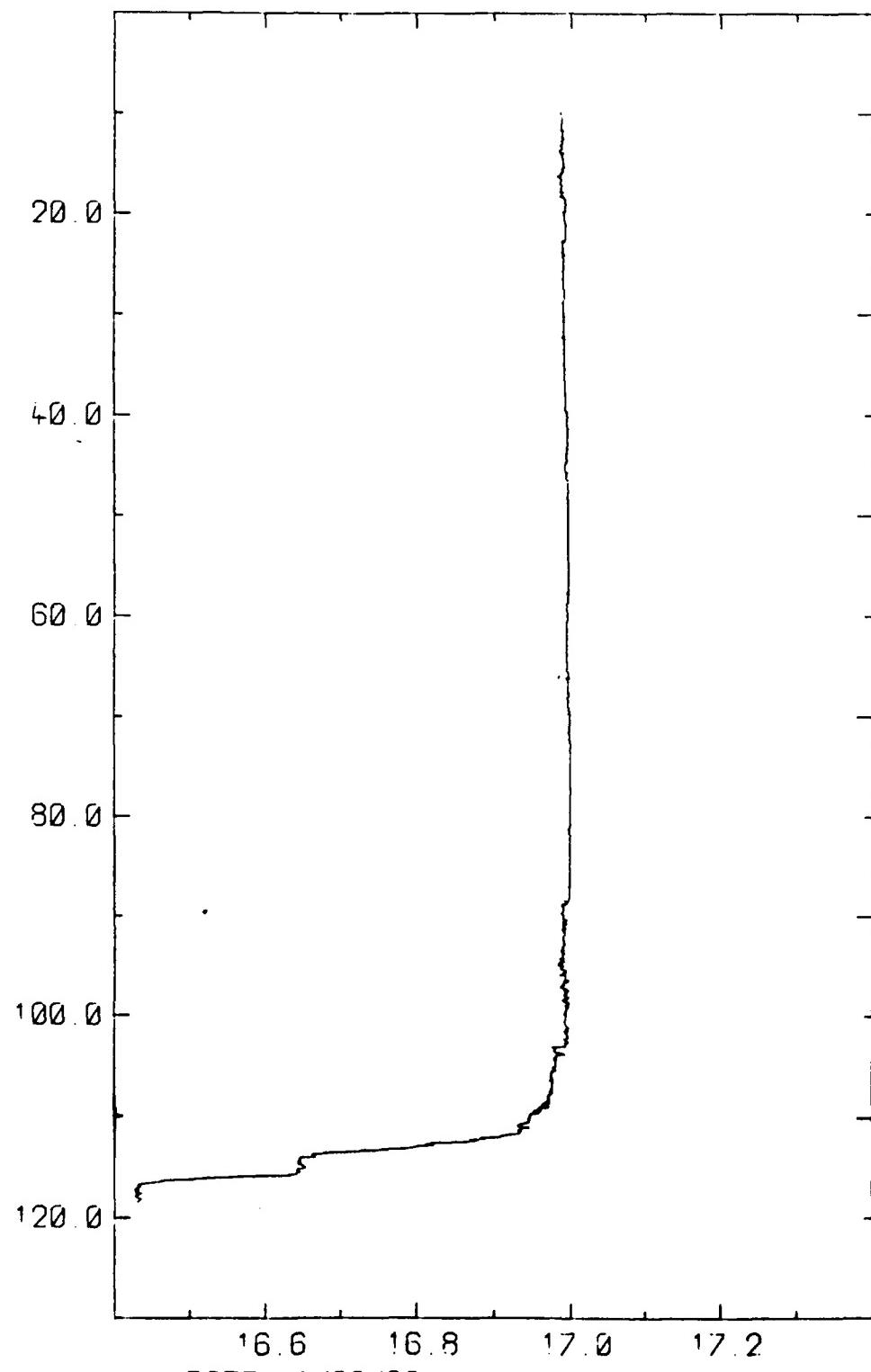
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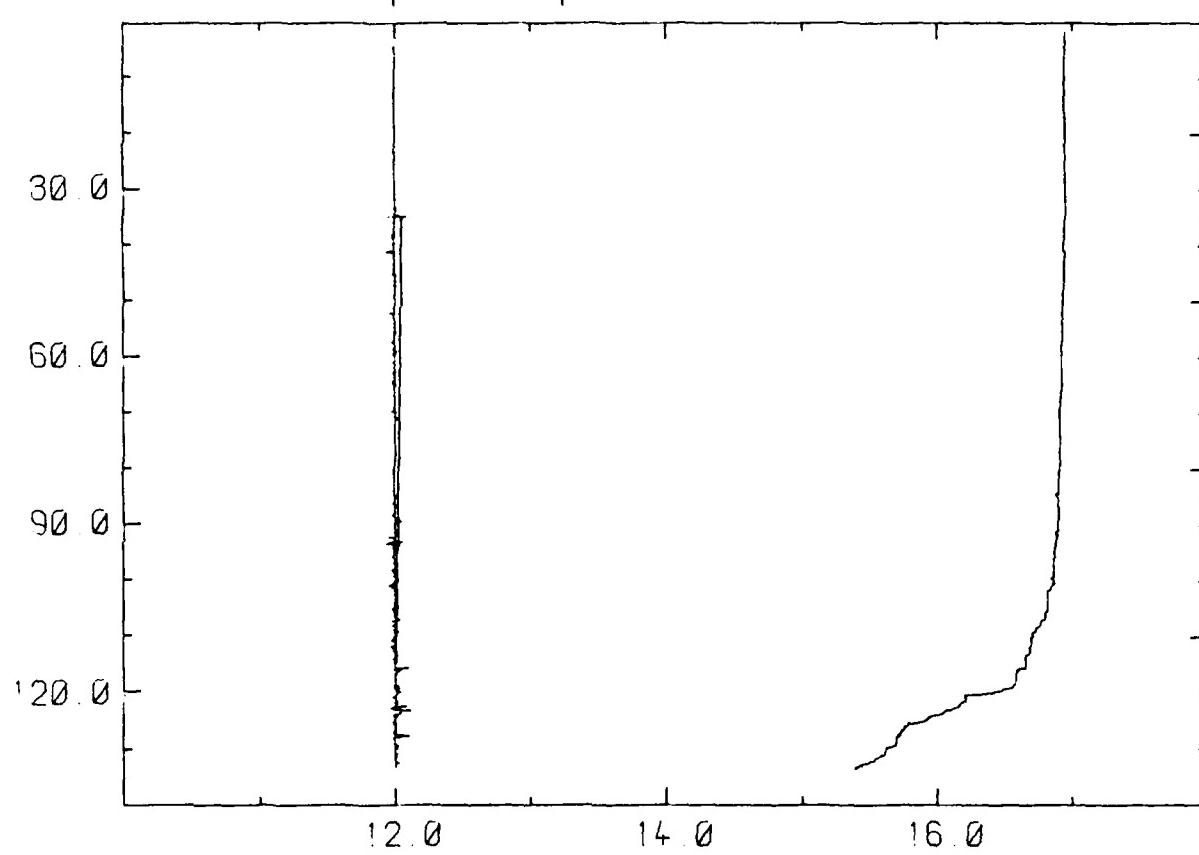


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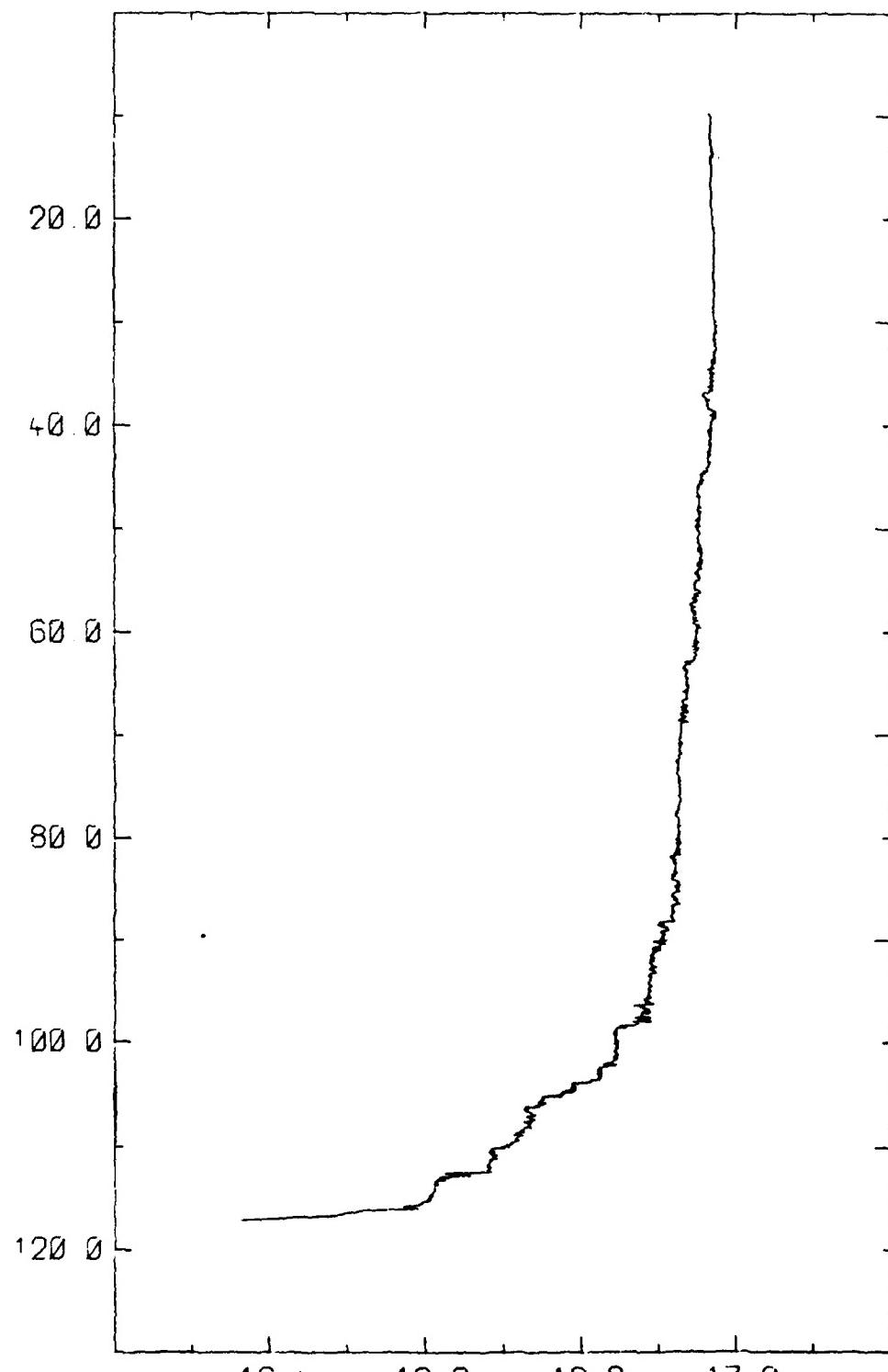
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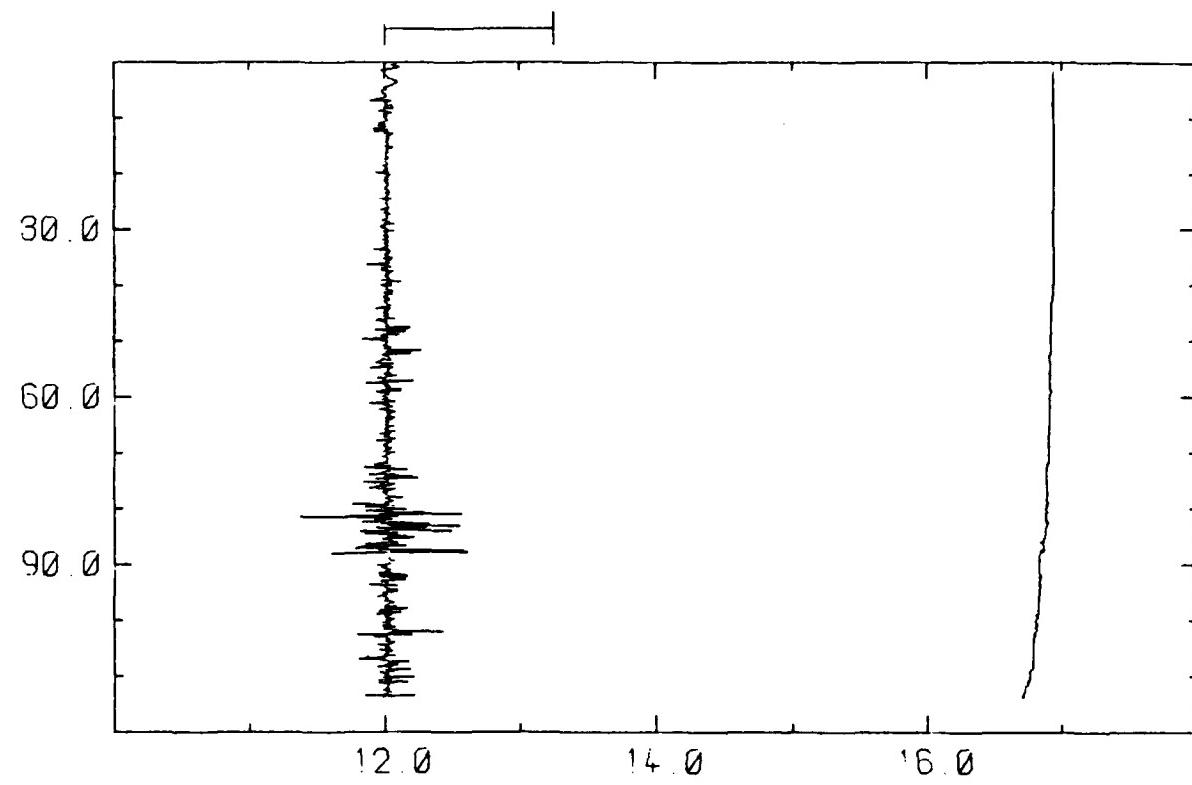


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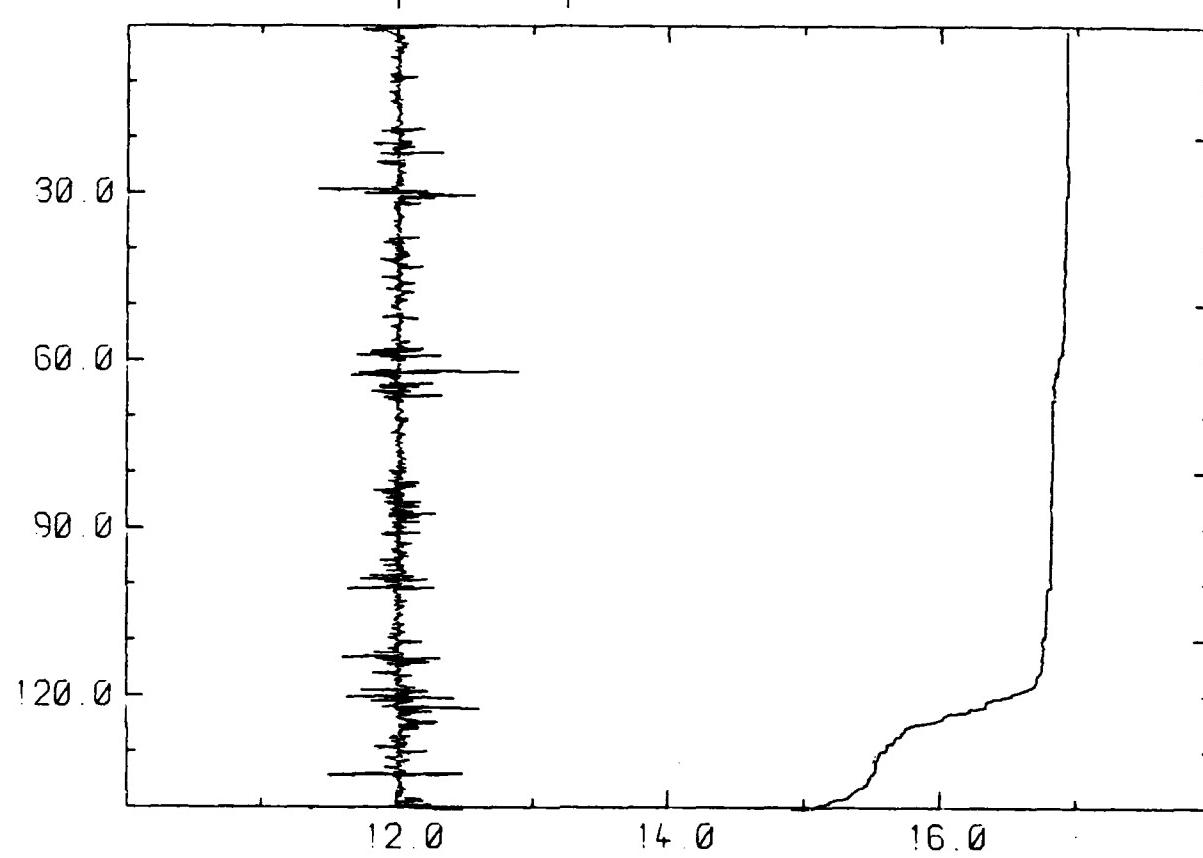


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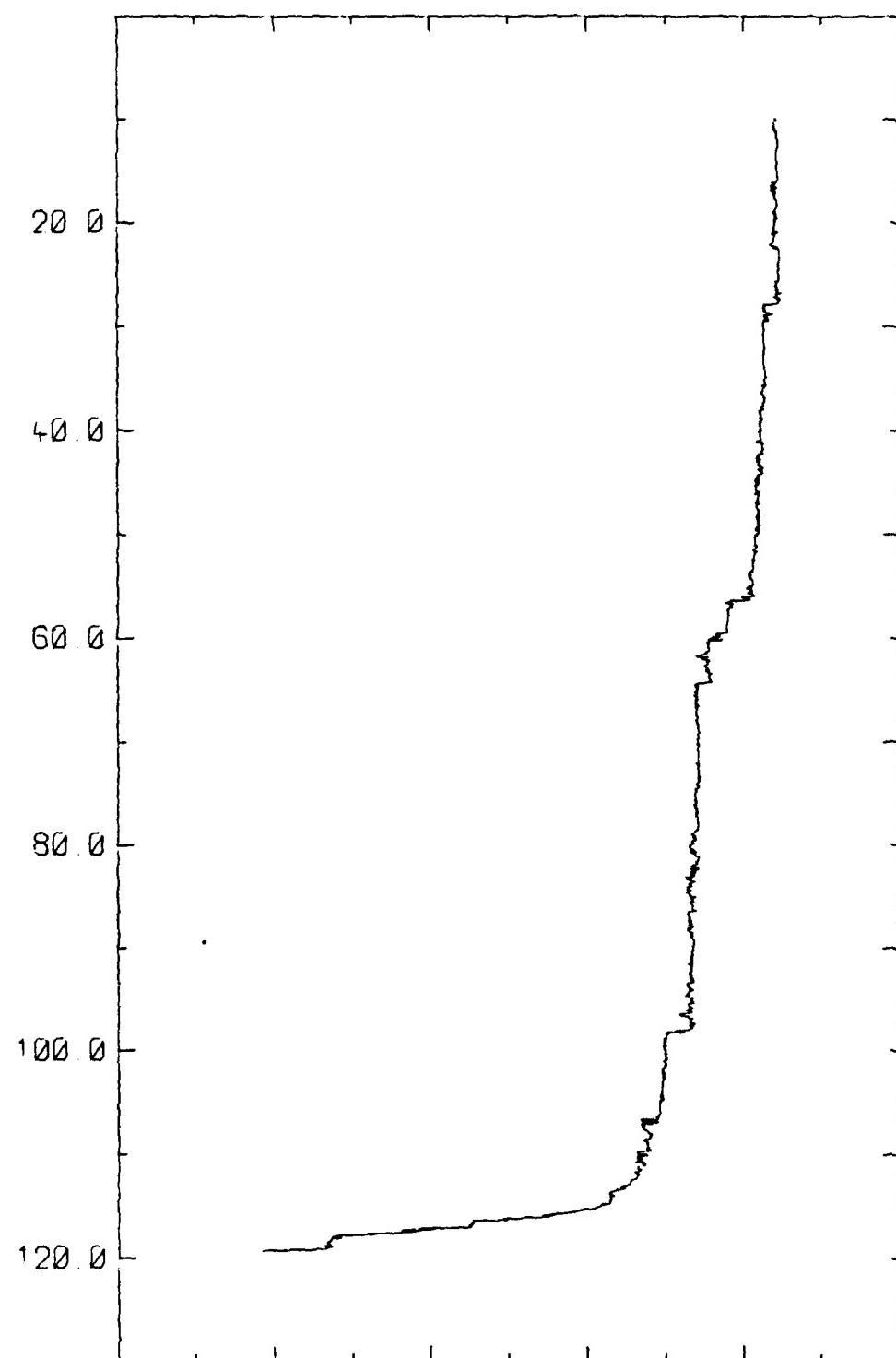
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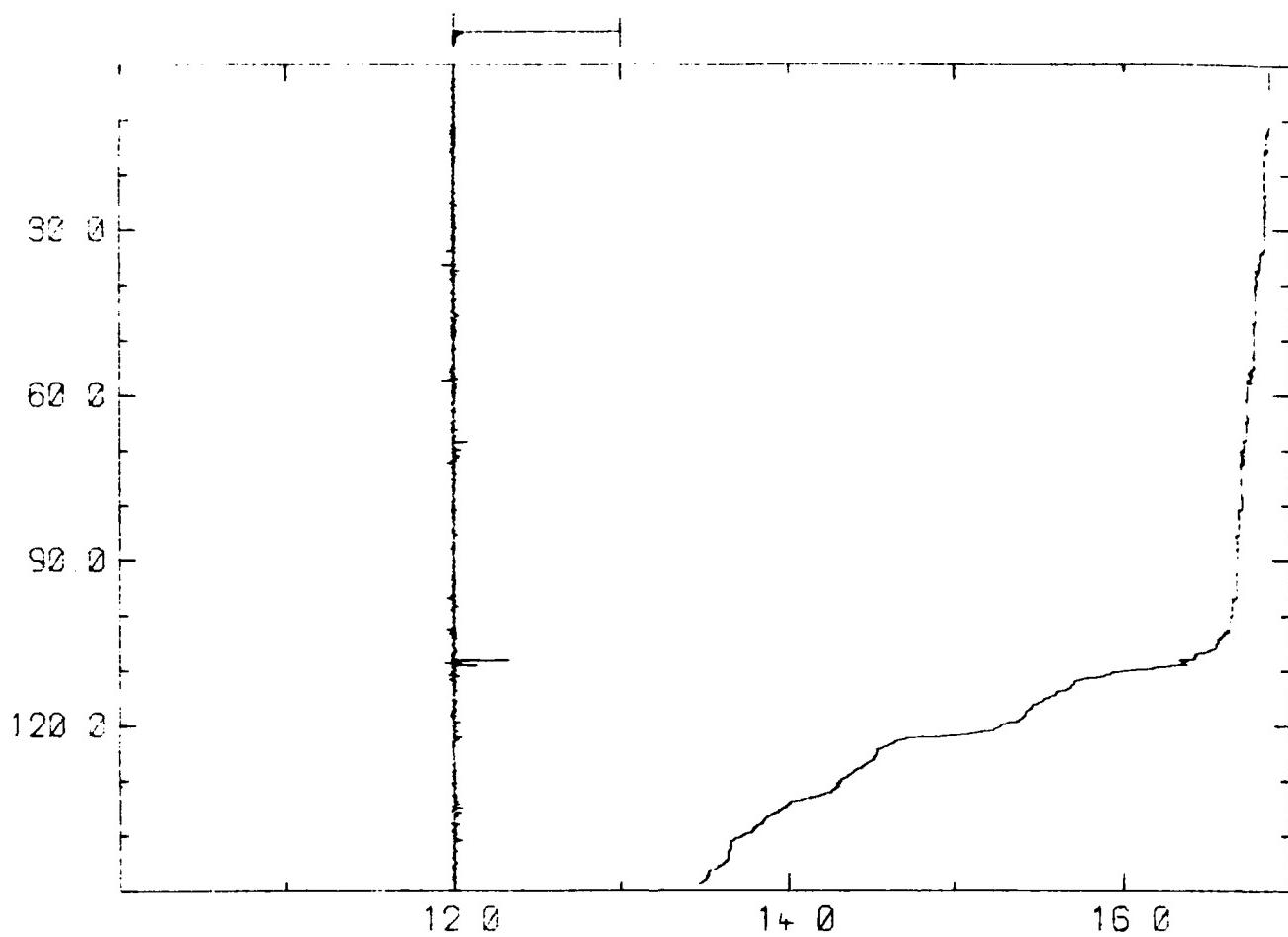


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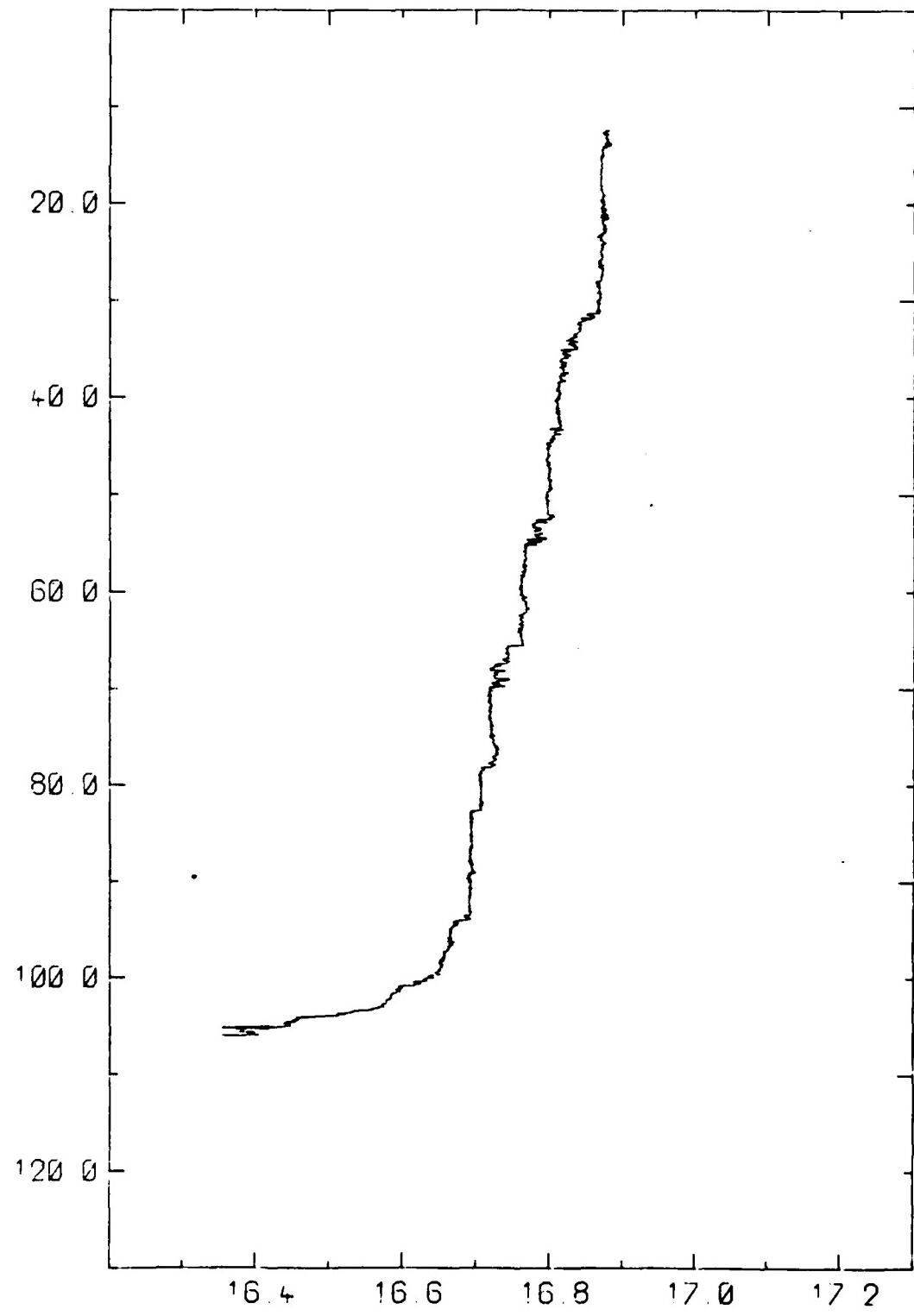
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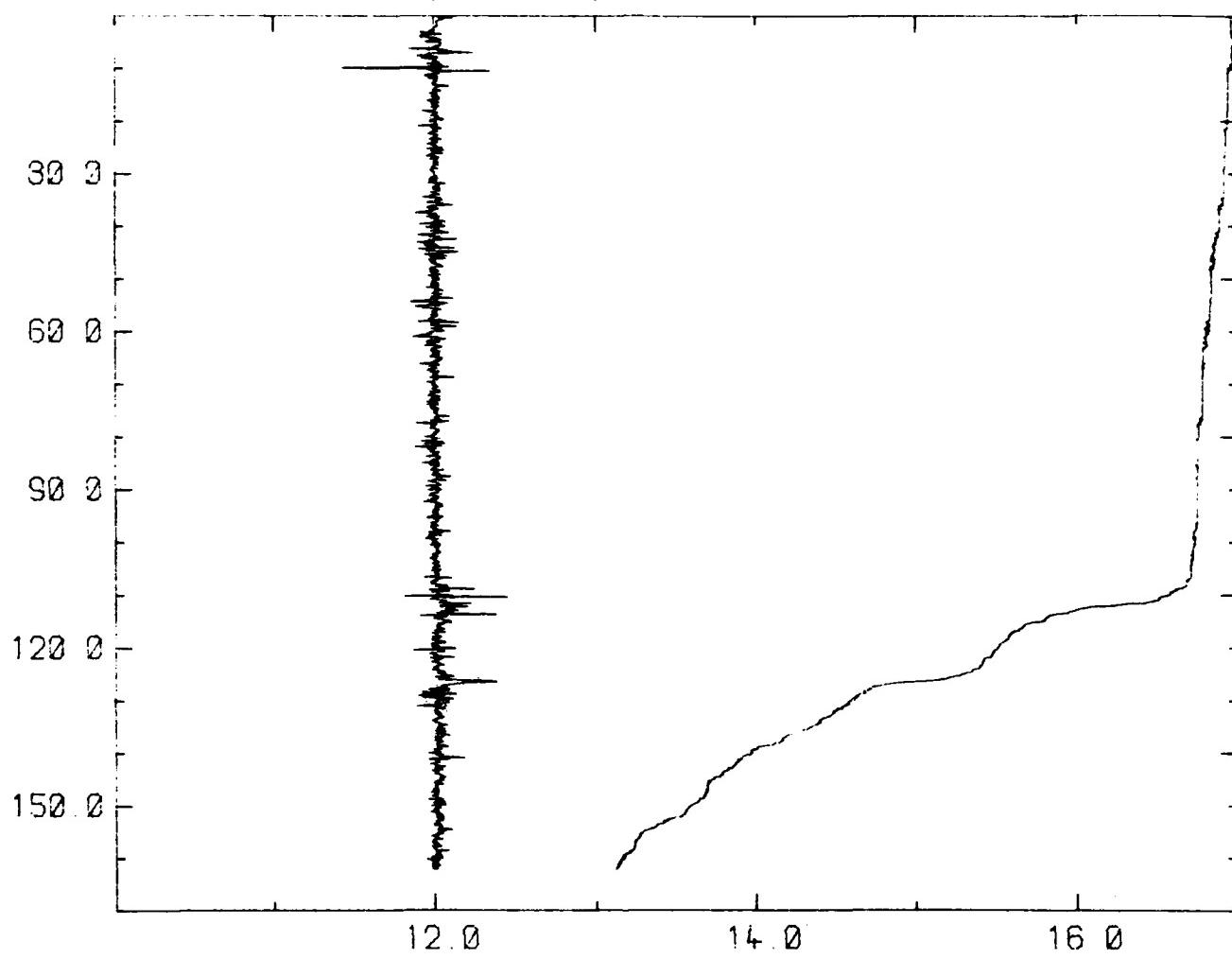


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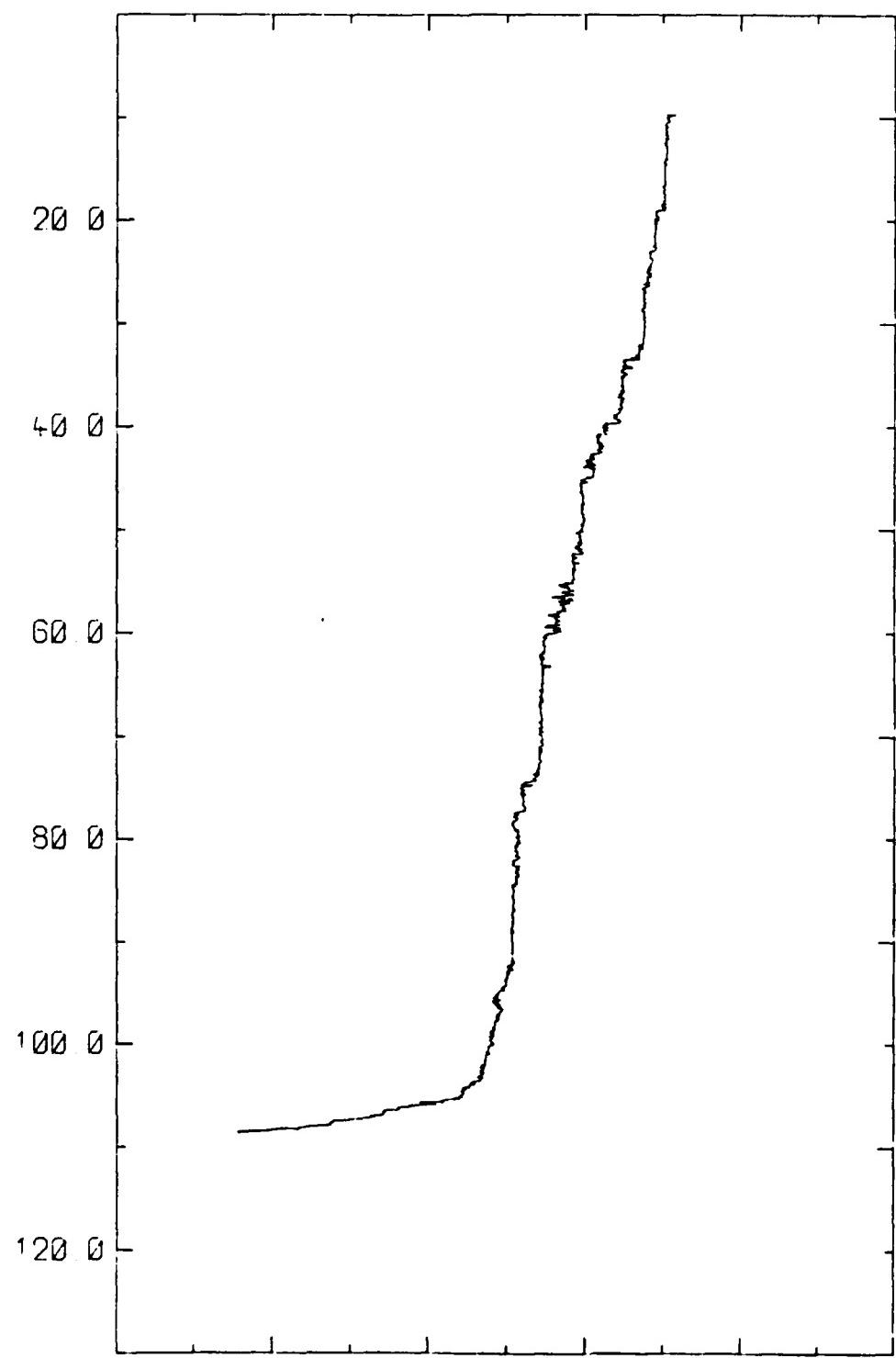
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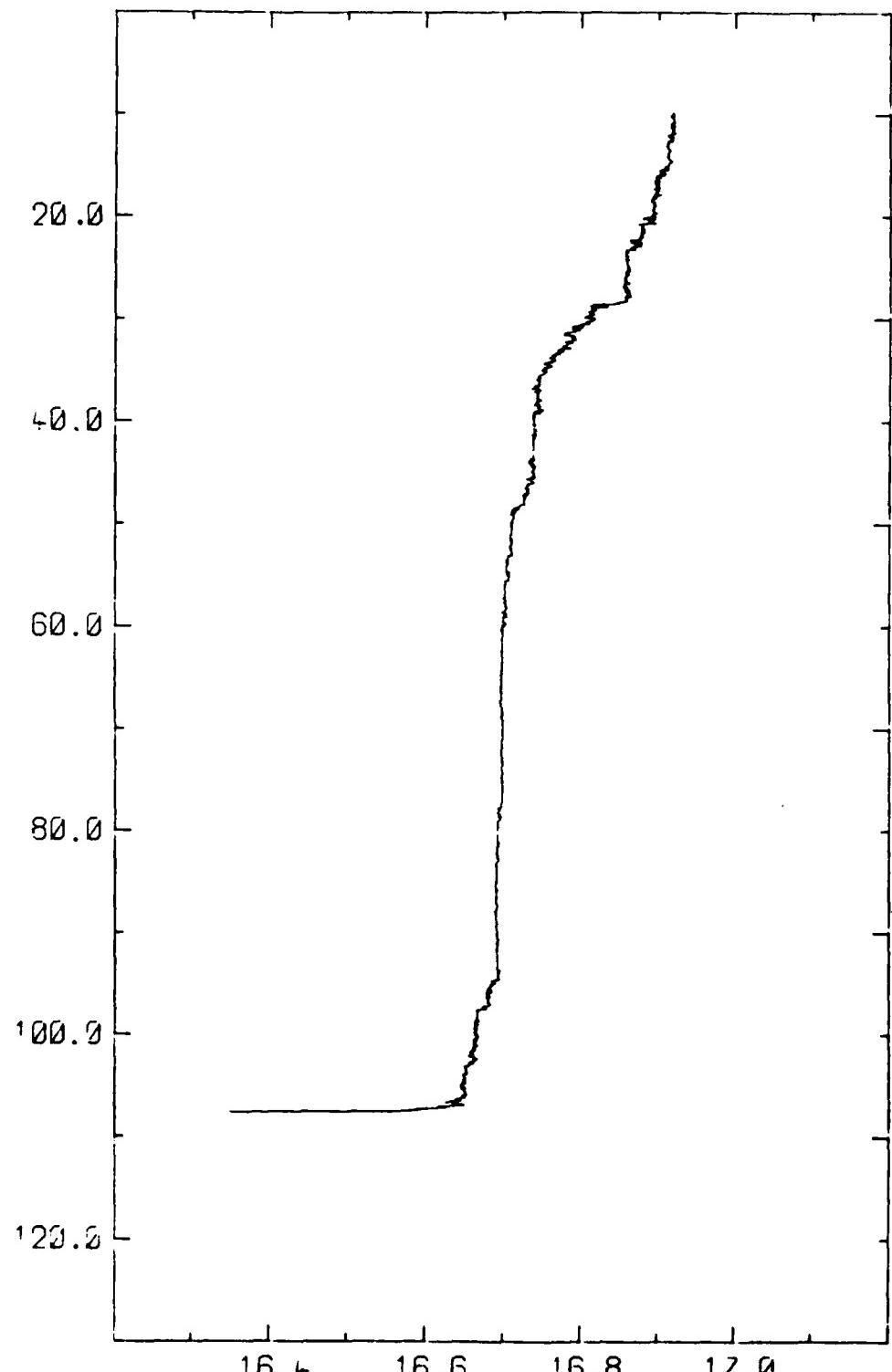
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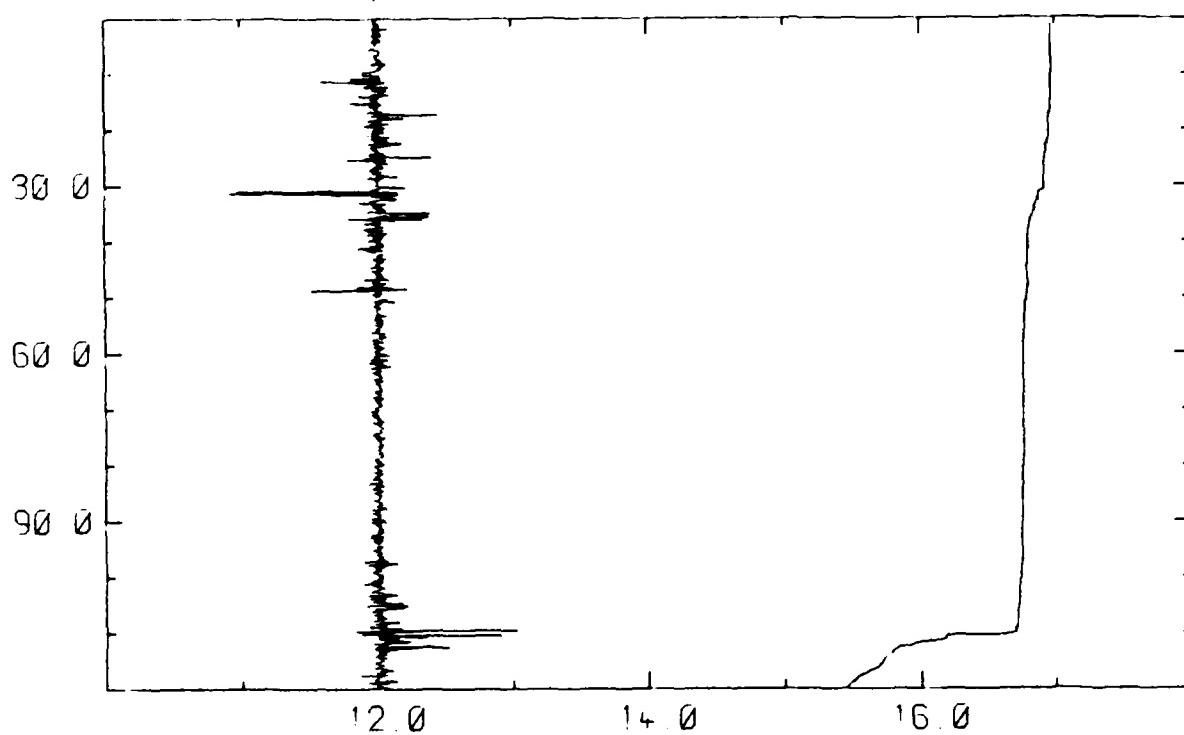


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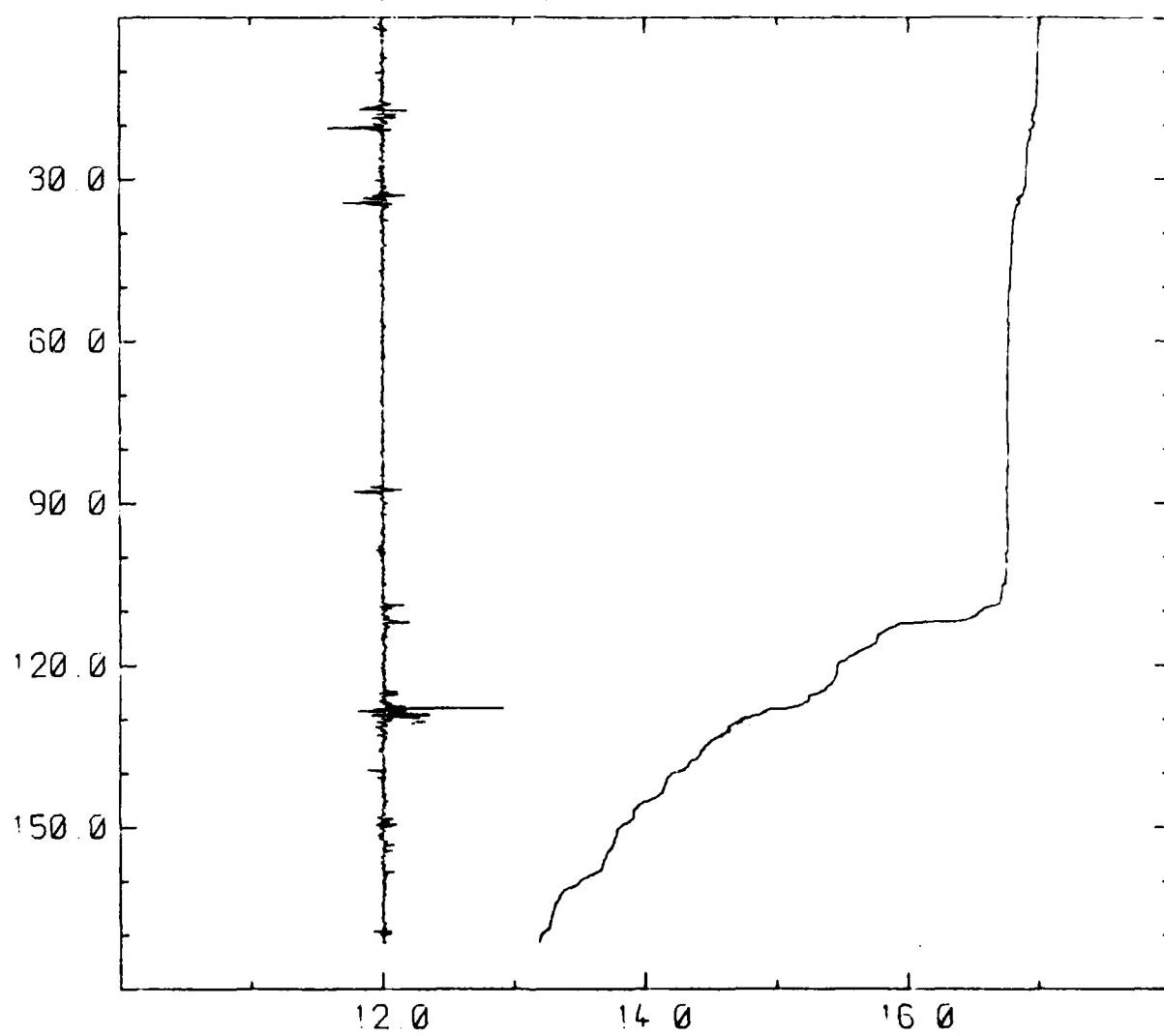


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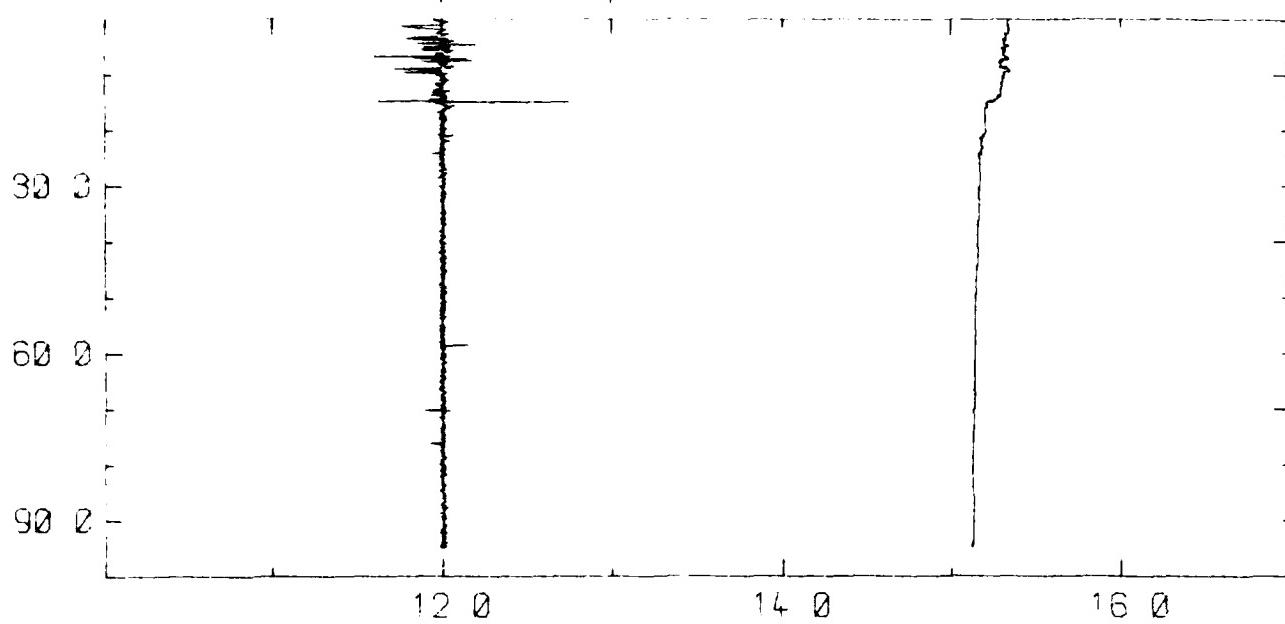
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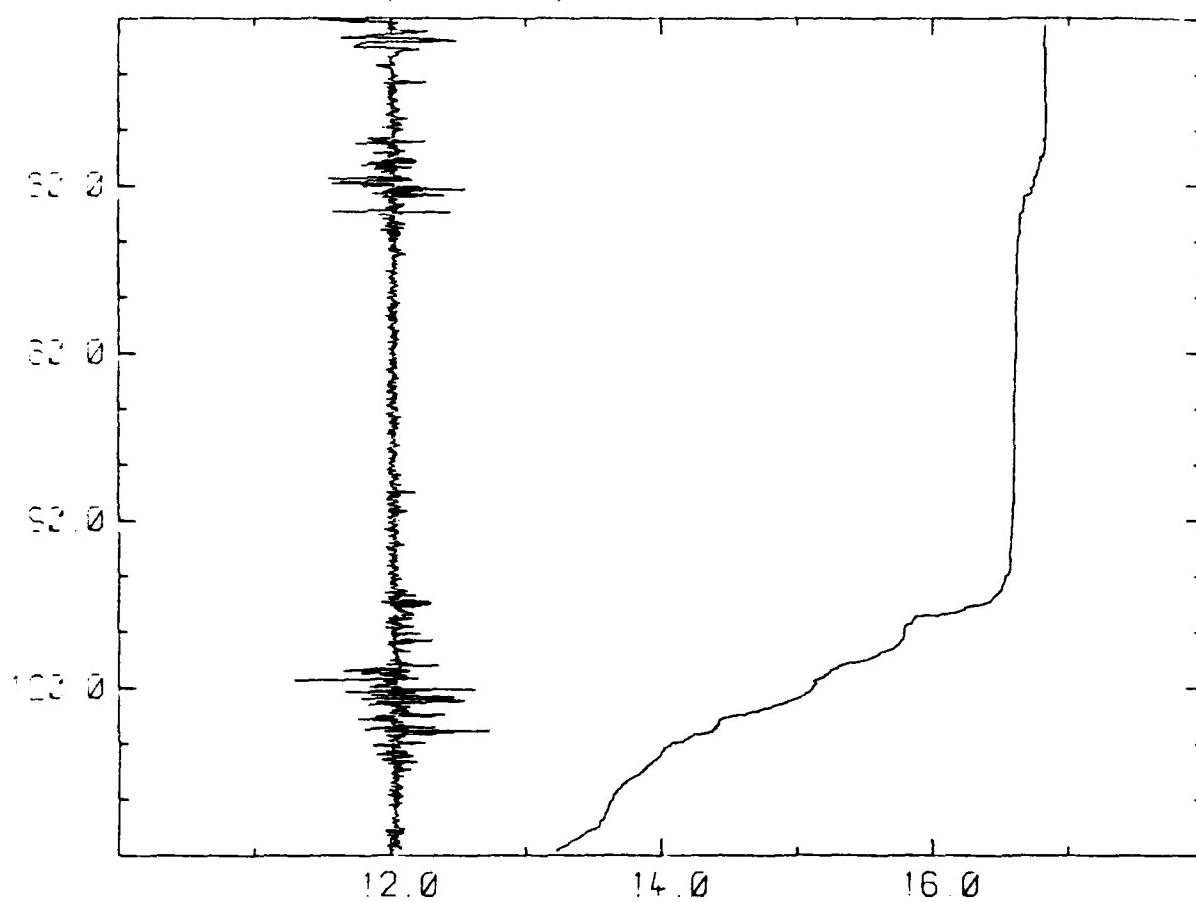
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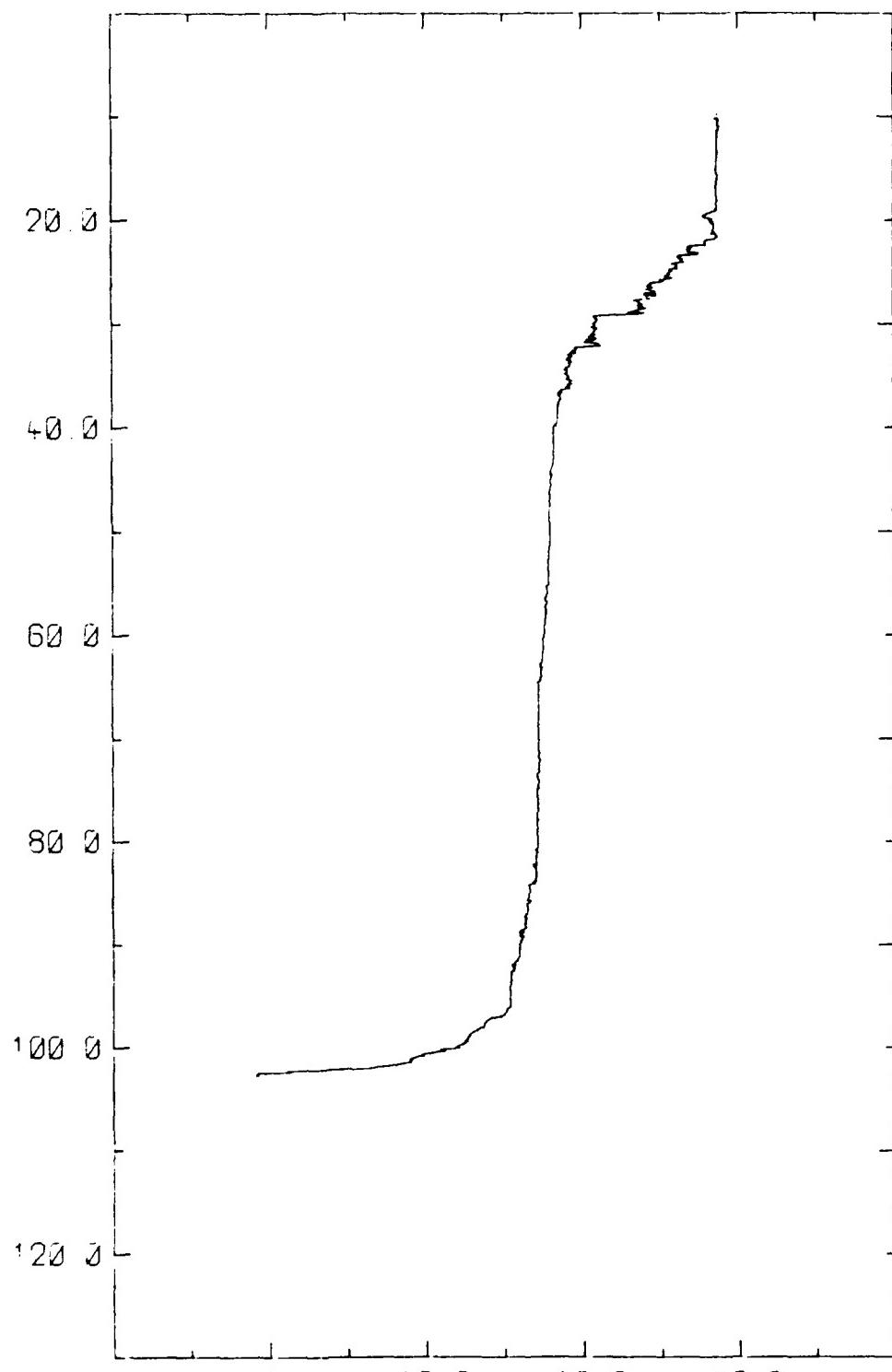
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DATE 1/24/80
TIME 0255 GMT

TAPE F2F FILE 2
UNIT 2.79

49

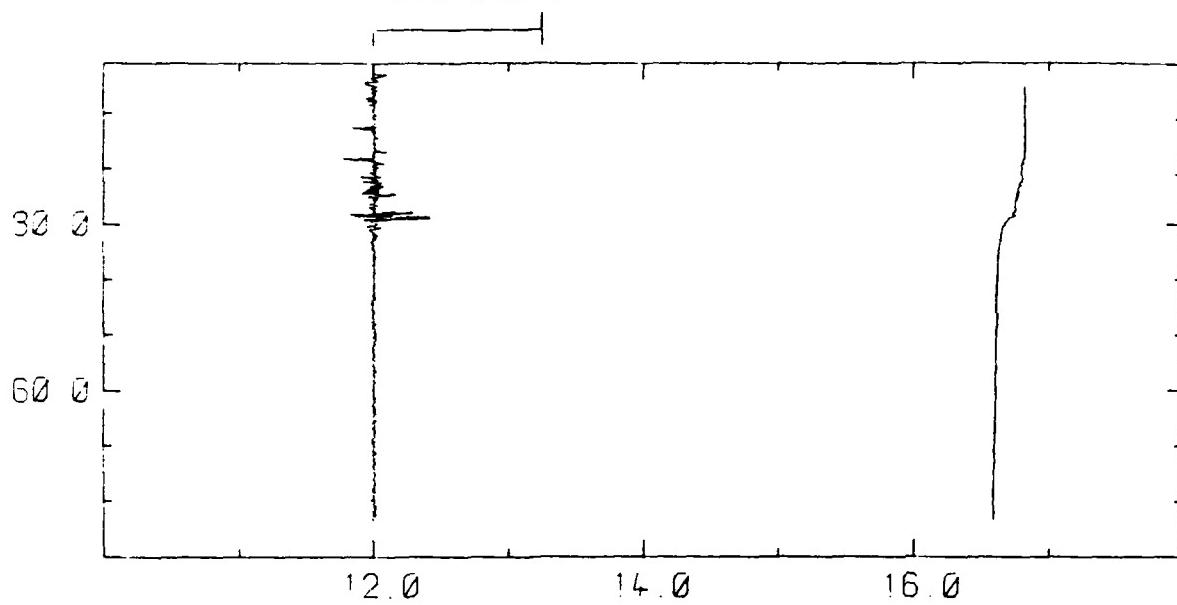


DATE 1/24/80
TIME 0255 GMT

50

TAPE F2F FILE 3
UNIT 2.79

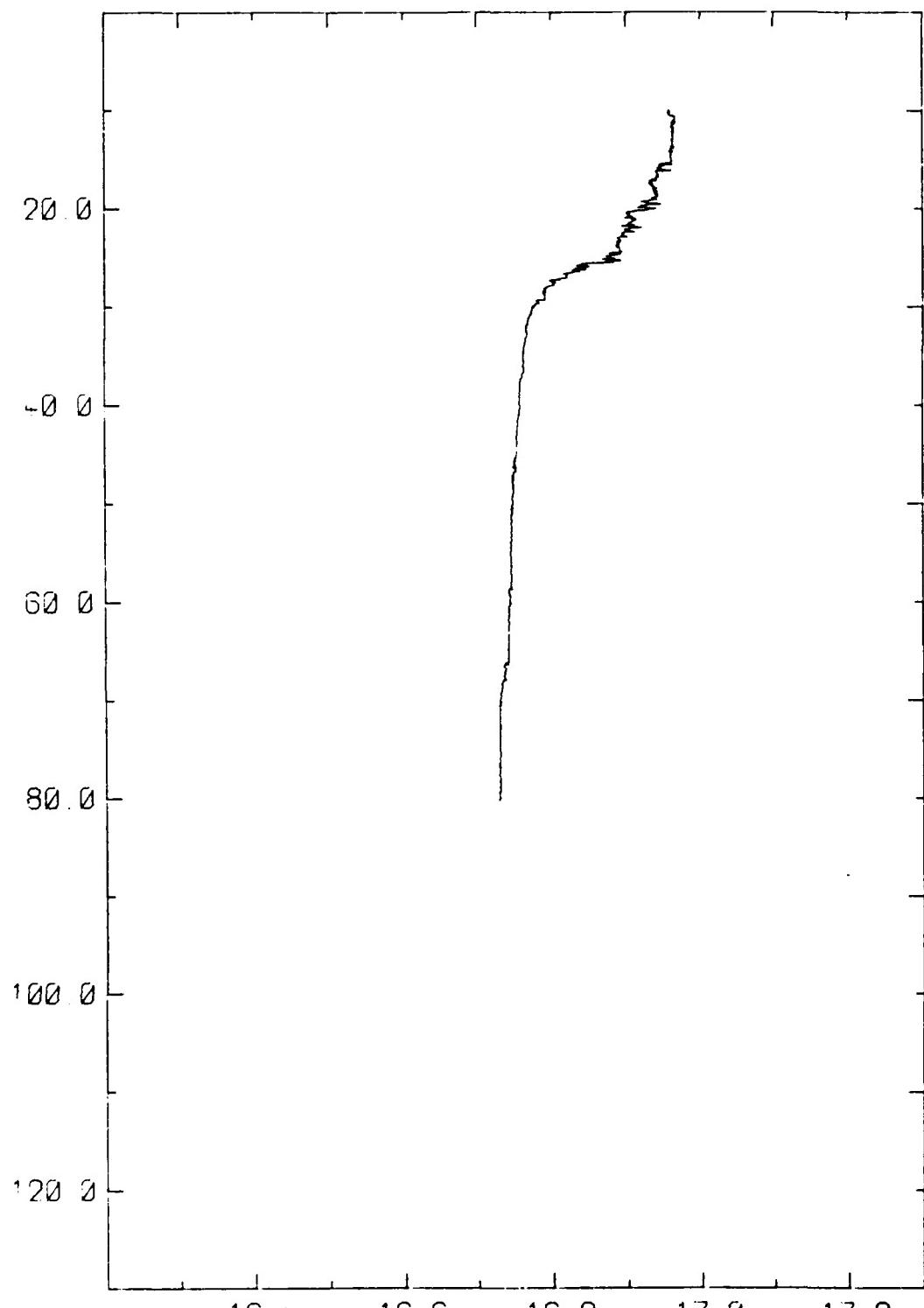
10.0 DEG/M



DATE 1/24/80
TIME 0327 GMT

TAPE F2F FILE 3
UNIT 2.79

51



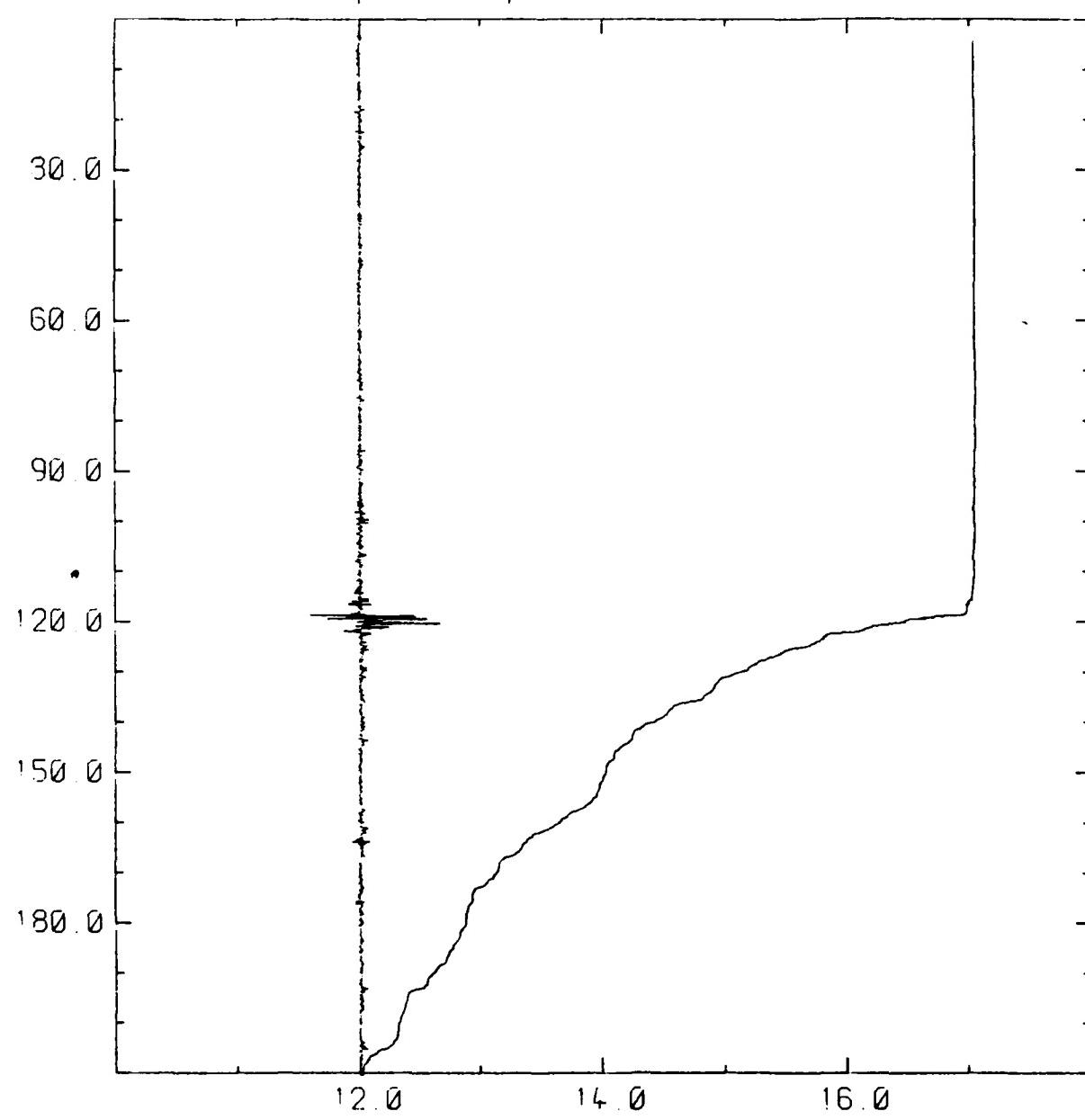
DATE 1/24/80

TIME 0327 GMT

52

TAPE F3A FILE 1
UNIT 2 79

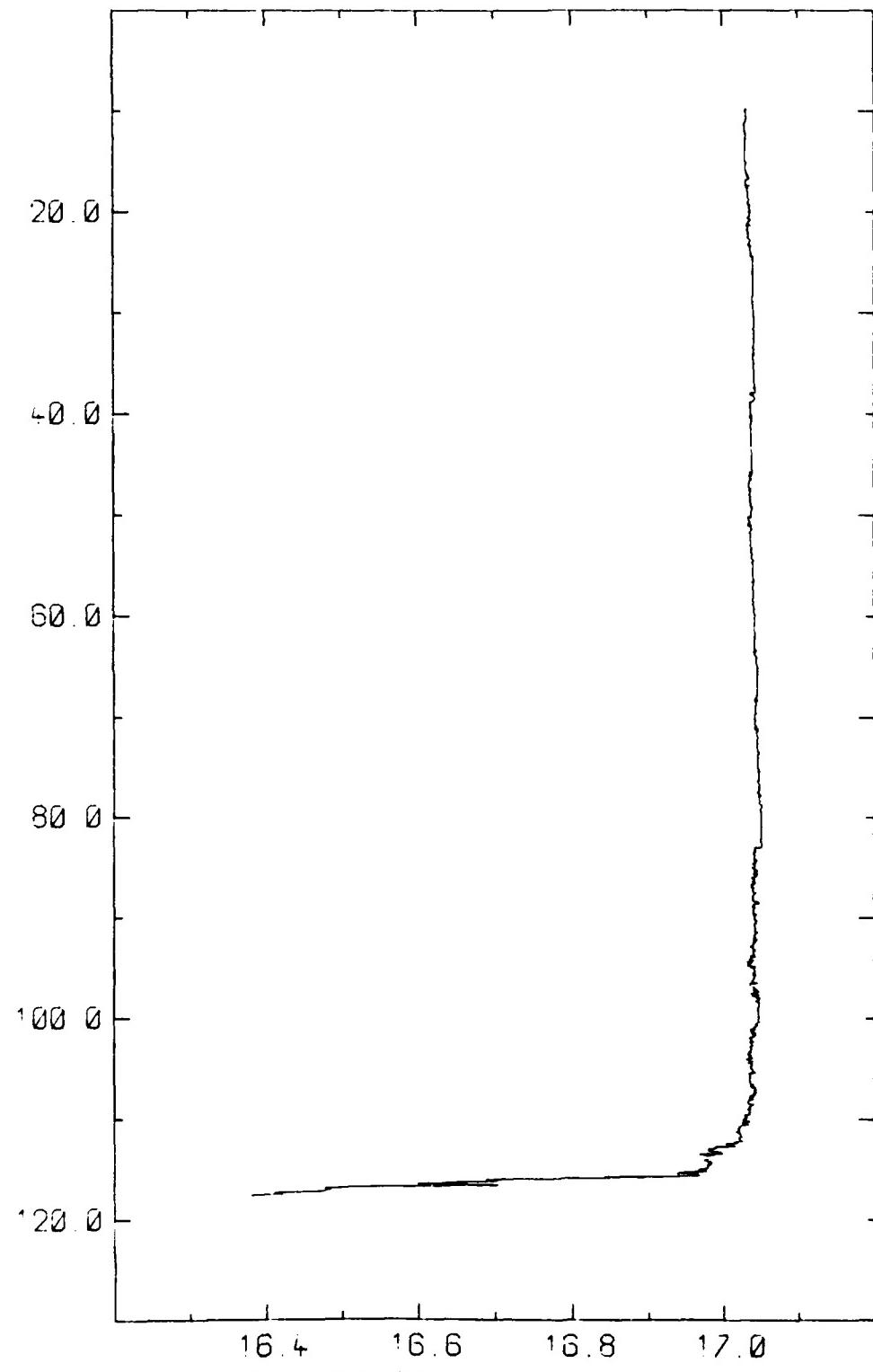
10.0 DEG/M



DATE 1/24/80
TIME 1903 GMT

TAPE F39 FILE 1
UNIT 2 79

53

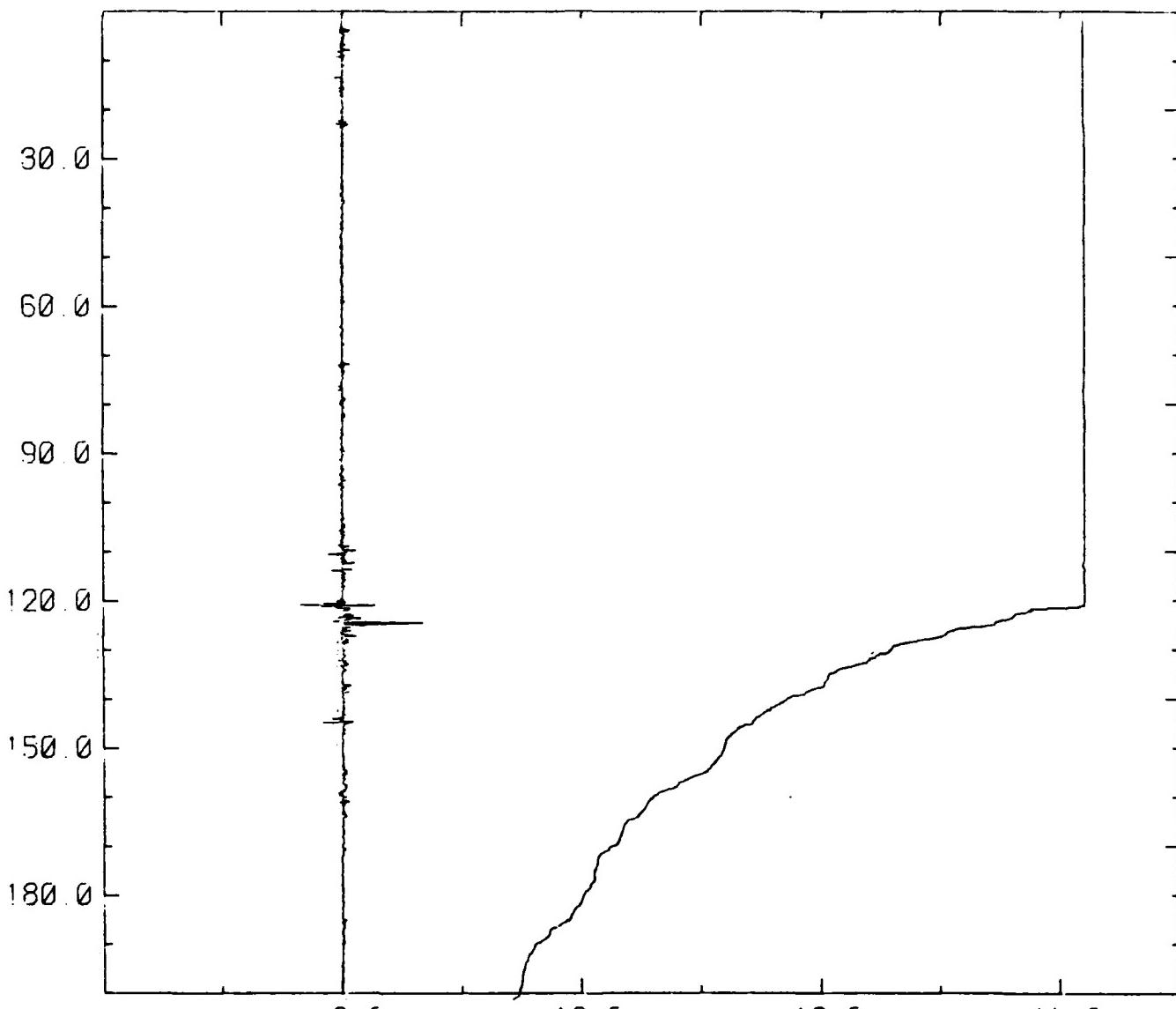


DATE 1/24/80
TIME 1903 GMT

54

TAPE F3B FILE 1
UNIT 5.79

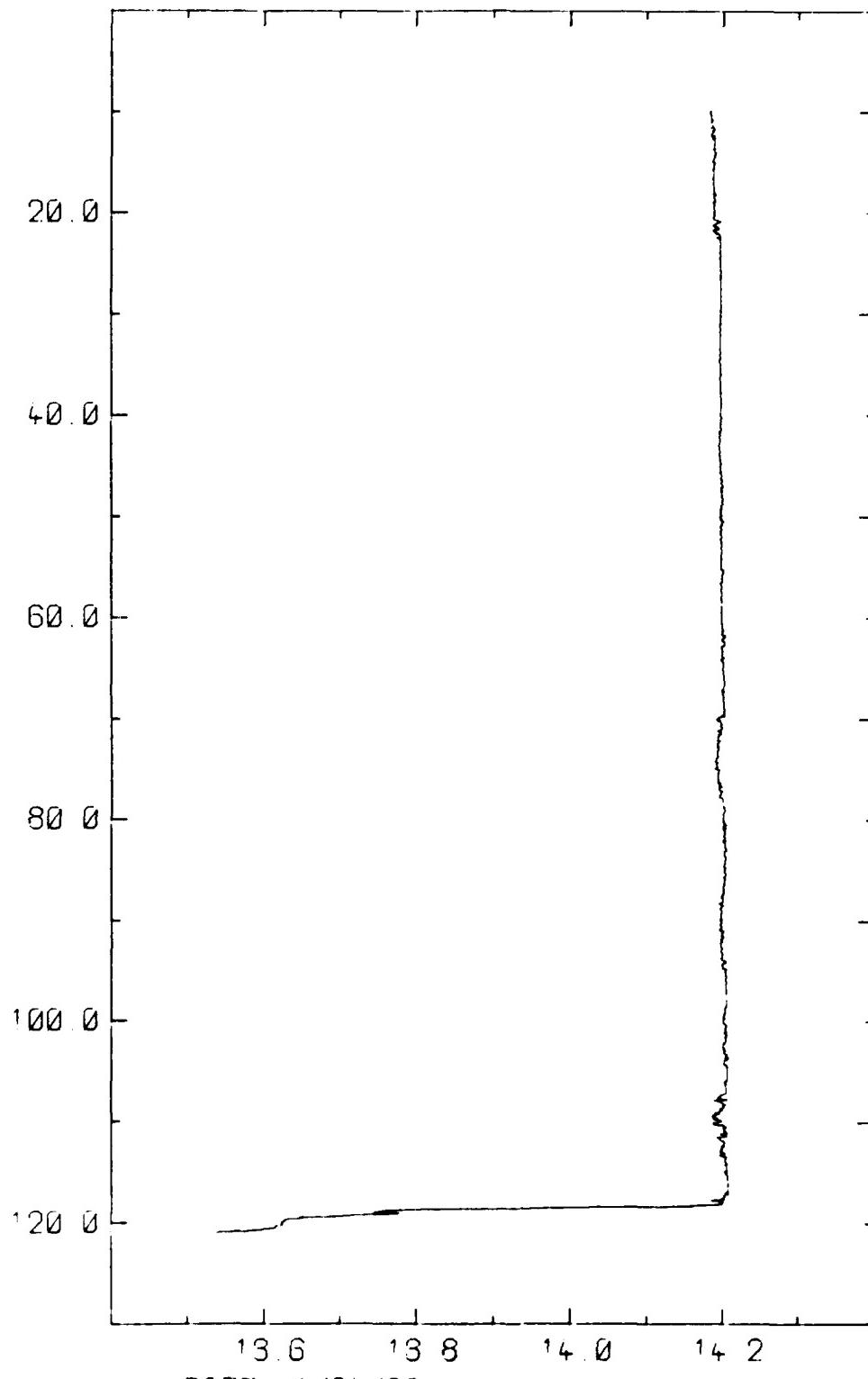
10.0 DEG/M



DATE 1/24/80
TIME 1949 GMT

TAPE F3B FILE 1
UNIT 5 79

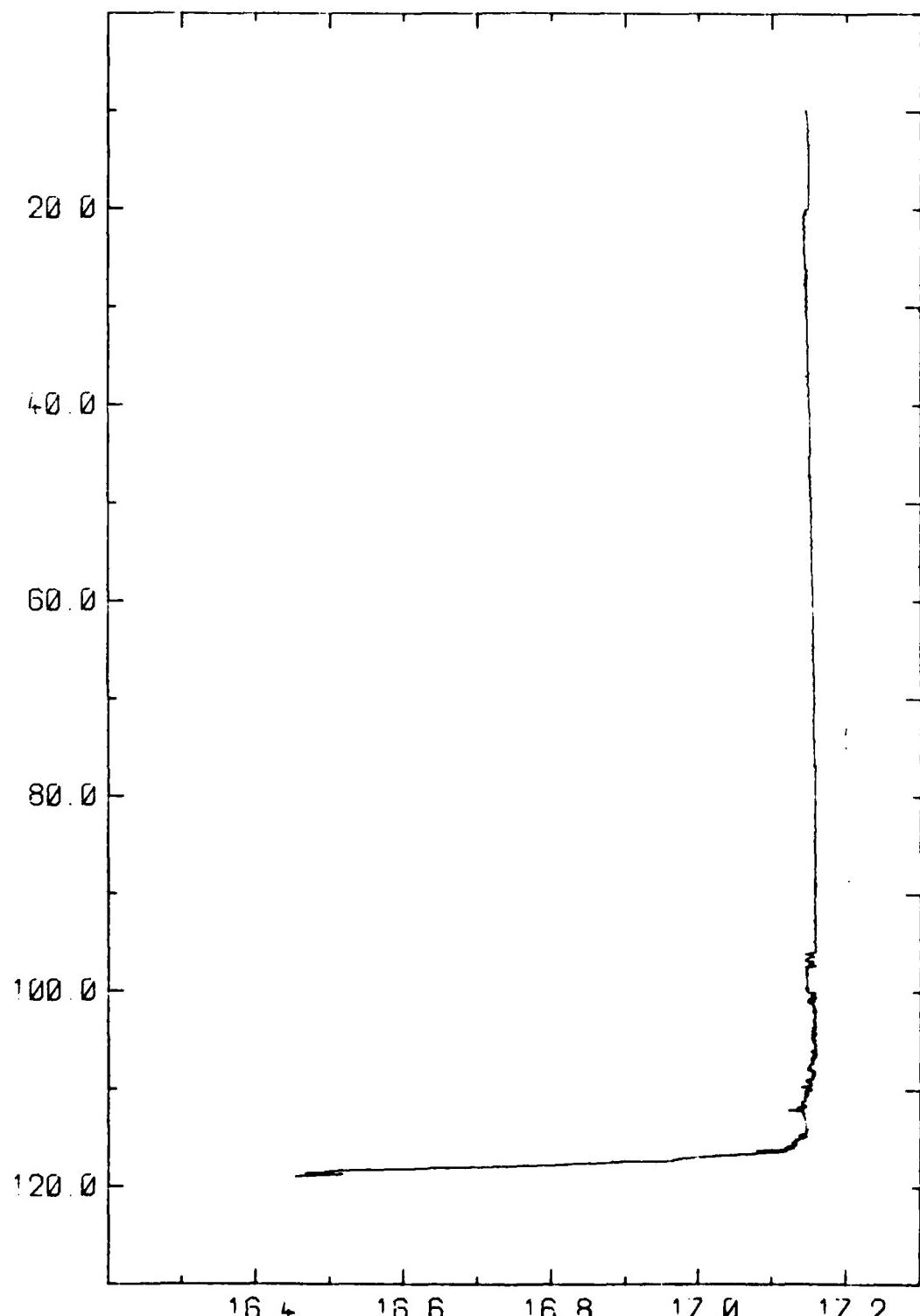
55



DATE 1/24/80
TIME 1949 GMT

56

TAPE F3C FILE 1
UNIT 2.79

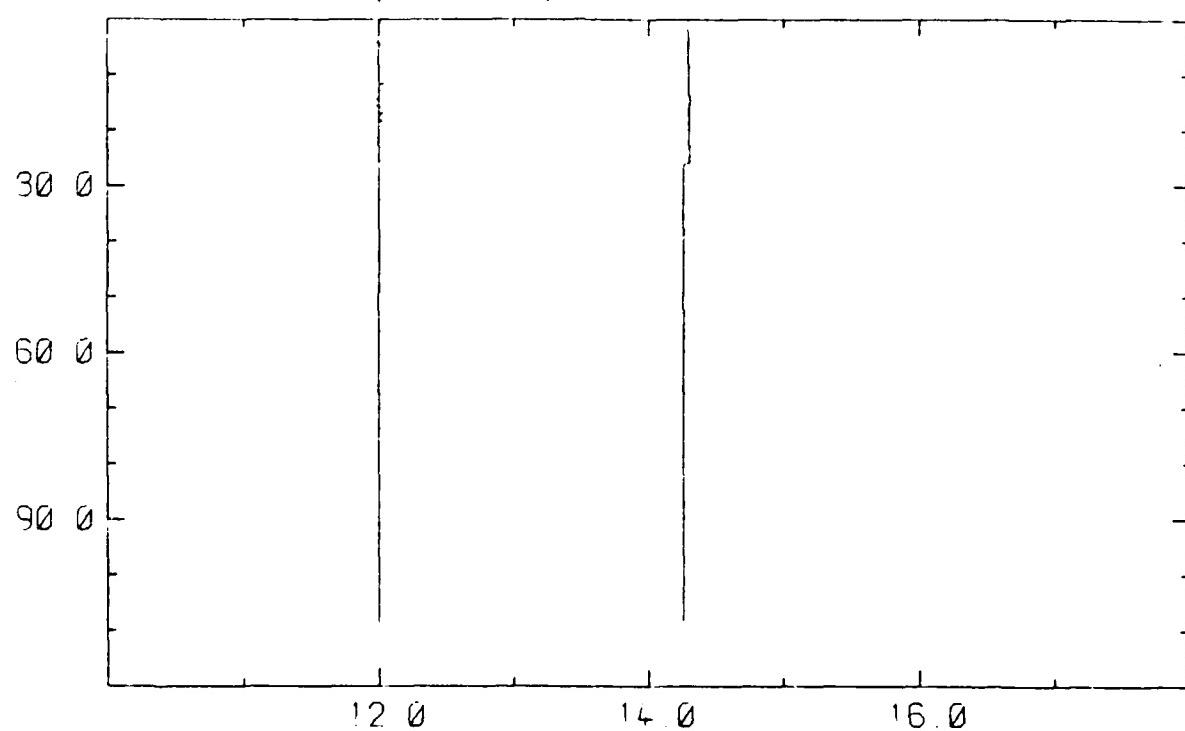


DATE 1/24/80
TIME 2059 GMT

TAPE F3C FILE 2
UNIT 5 79

57

100 0 DEG/M

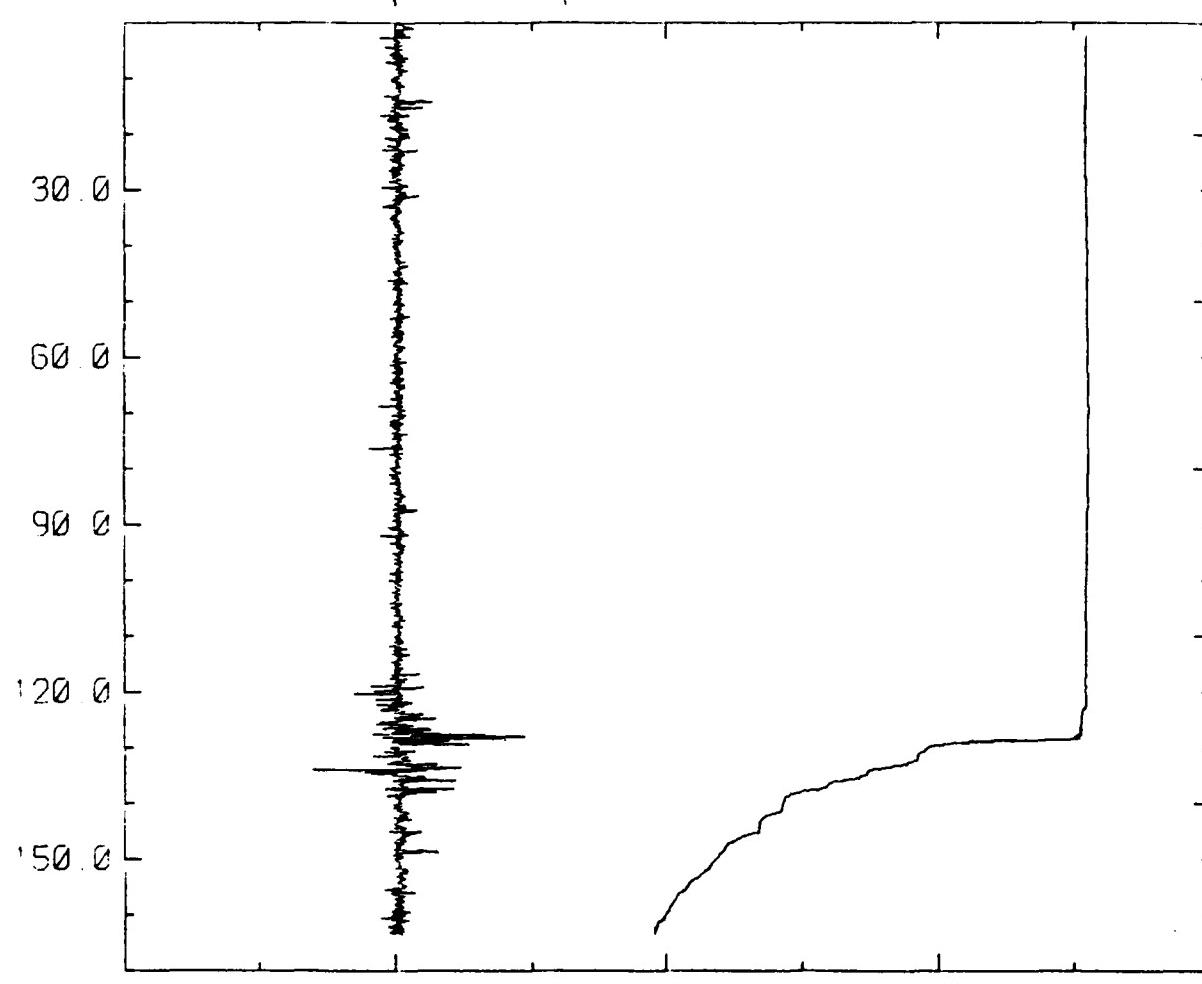


DATE 1/24/80
TIME 2136 GMT

58

TAPE F3D FILE 2
UNIT 2.79

3.0 DEG/M

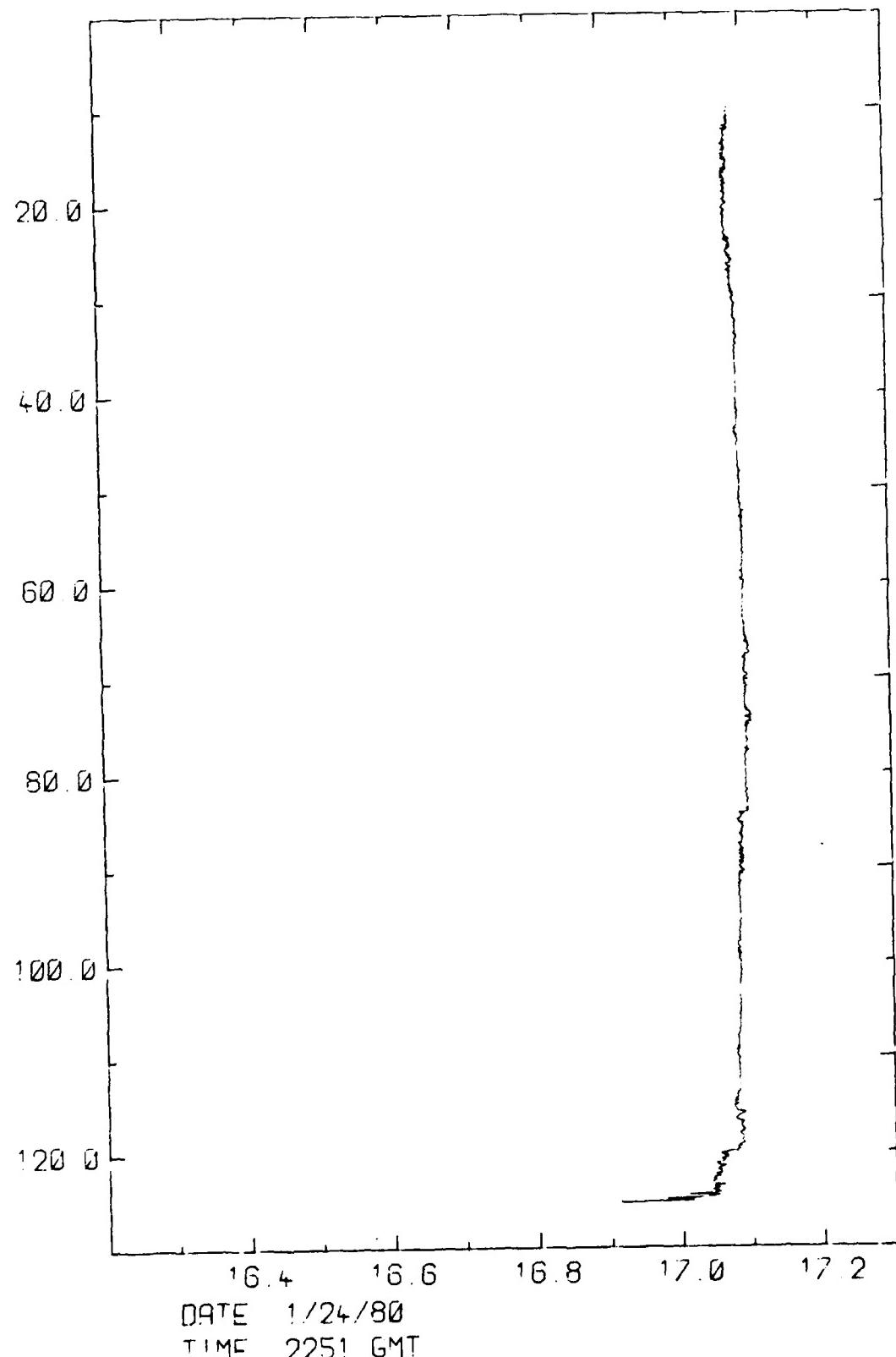


DATE 1/24/80

TIME 2251 GMT

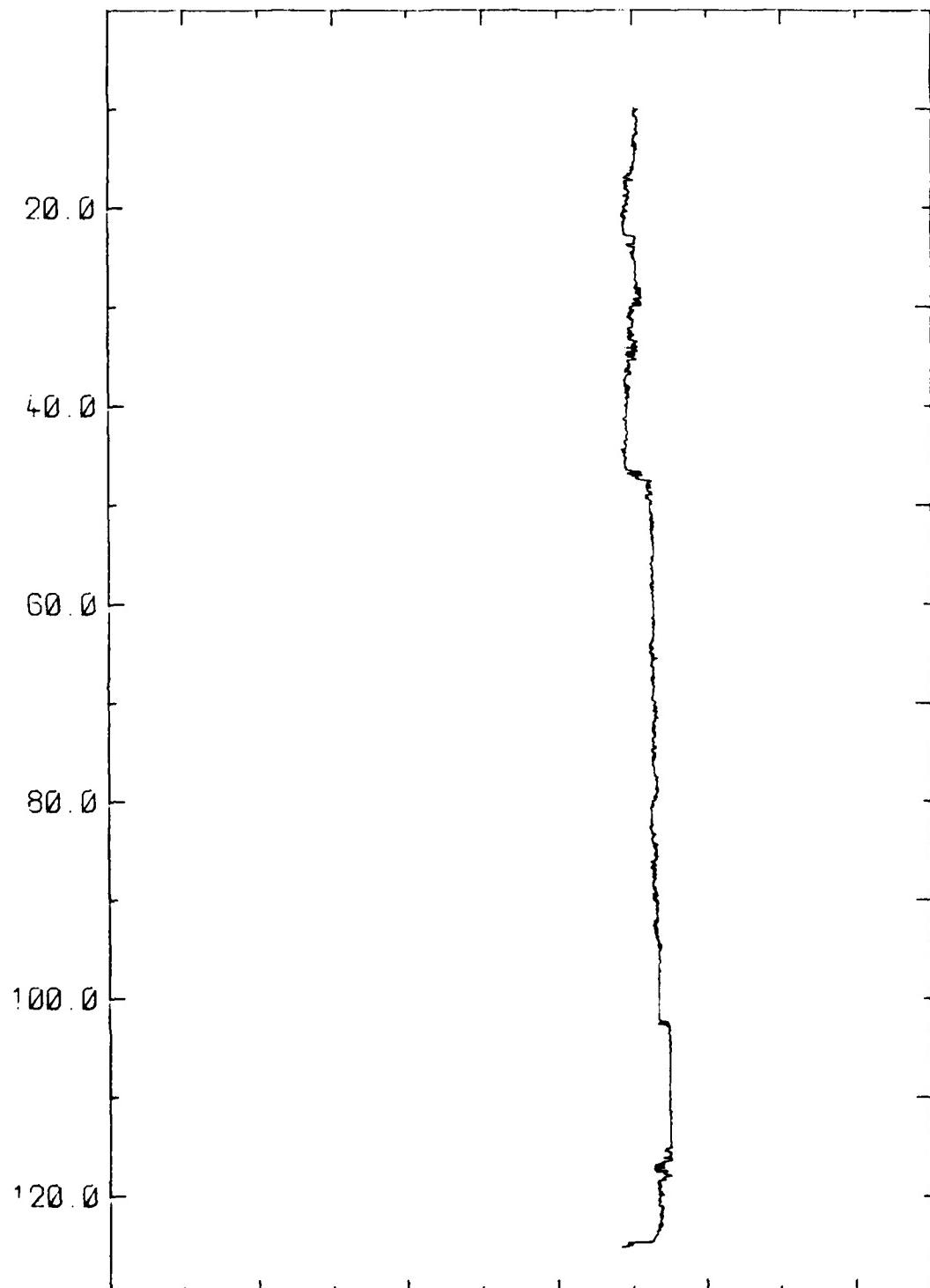
TAPE F3D FILE 2
UNIT 2 79

59



60

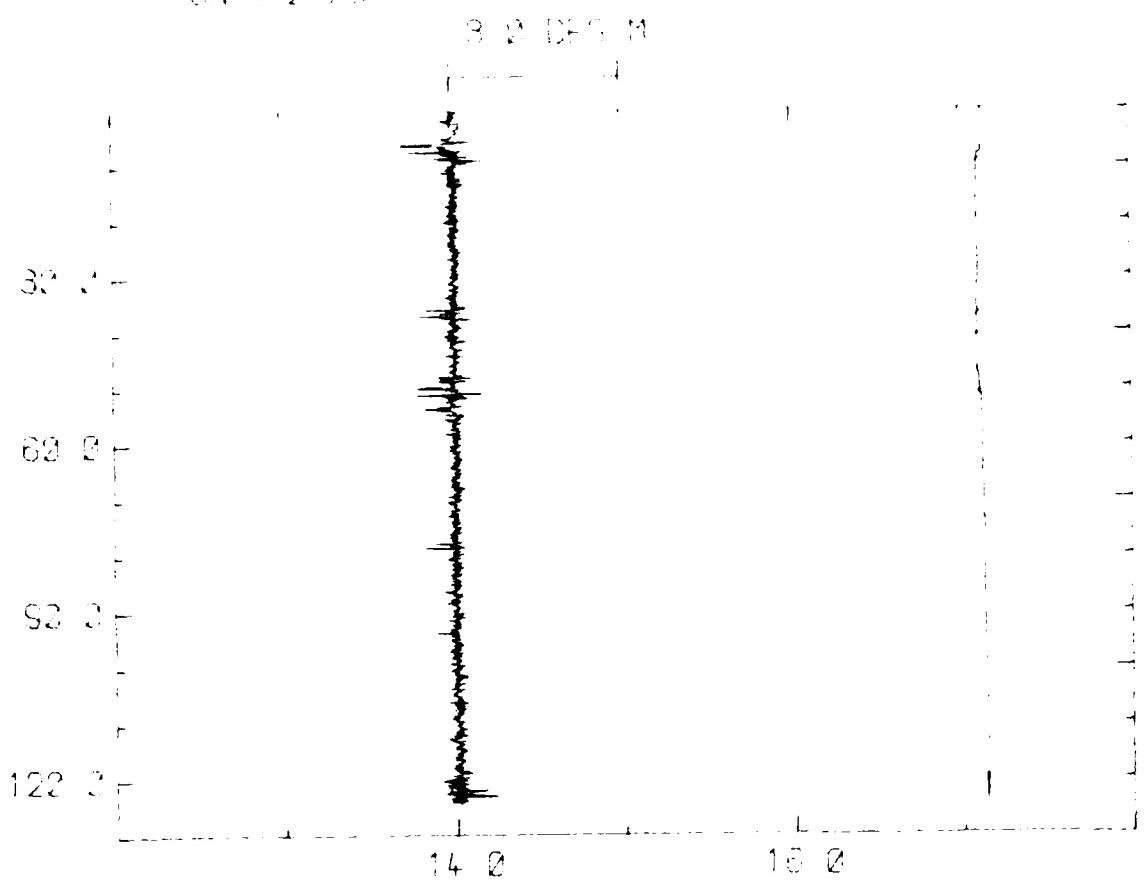
TAPE F3E FILE 1
UNIT 2.79



DATE 1/24/80

TIME 2317 GMT

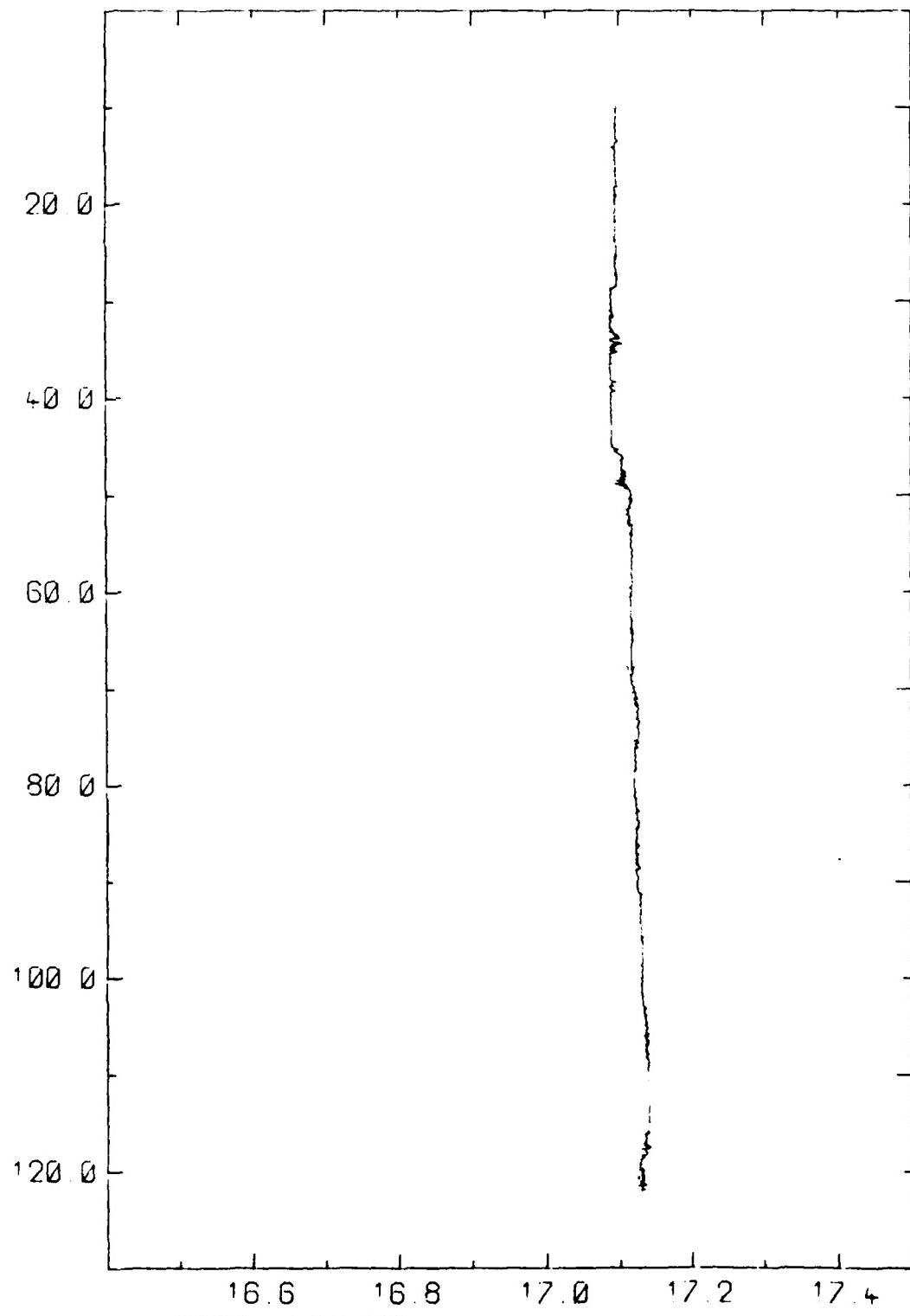
1947-34 FILE 2
UN. T. S. 3



DATE 1/24/80
TIME 2352 GMT

62

TAPE F3E FILE 2
UNIT 2.79

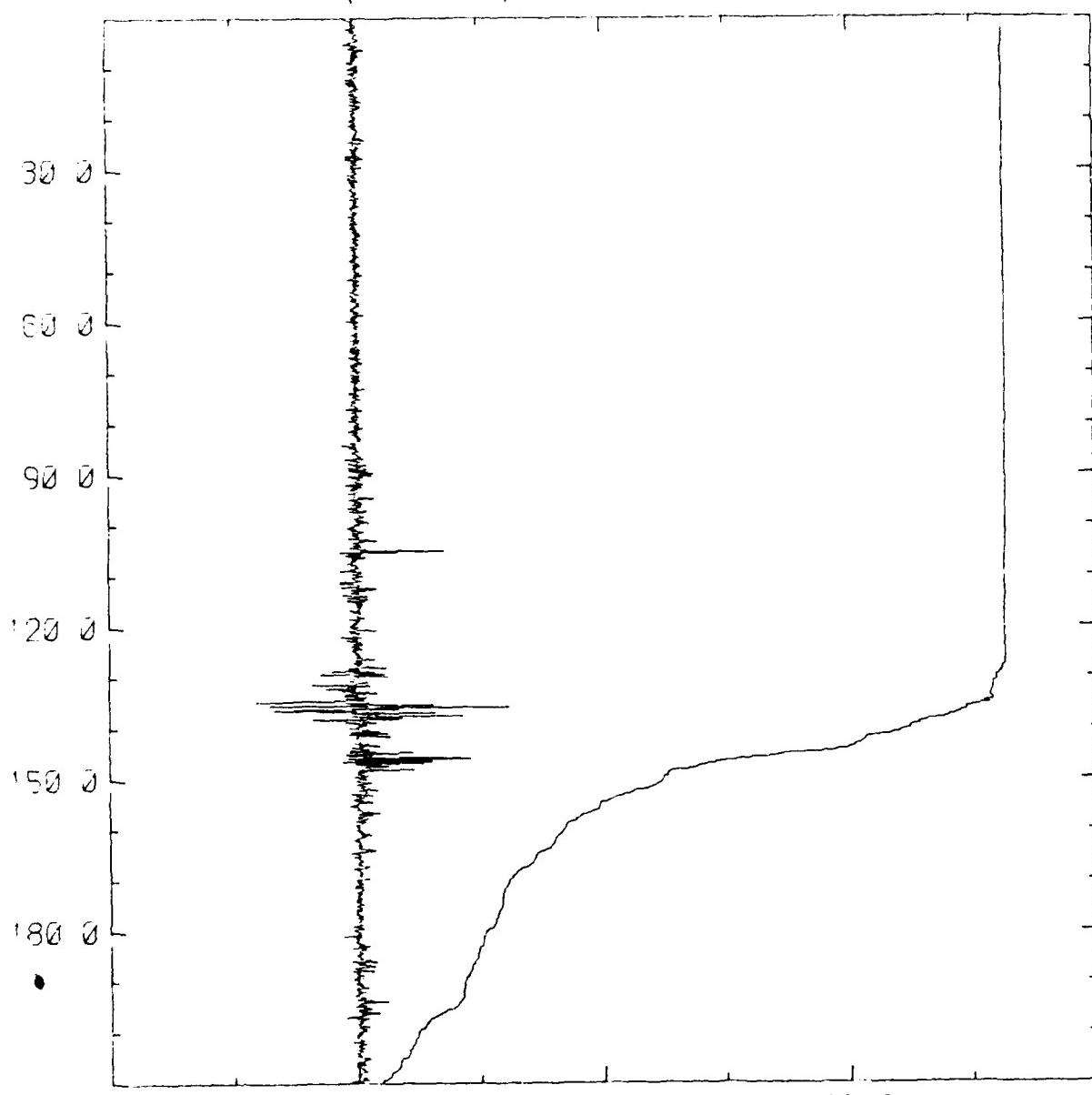


DATE 1/24/80
TIME 2352 GMT

TAPE F5A FILE 1
UNIT 2 /9

63

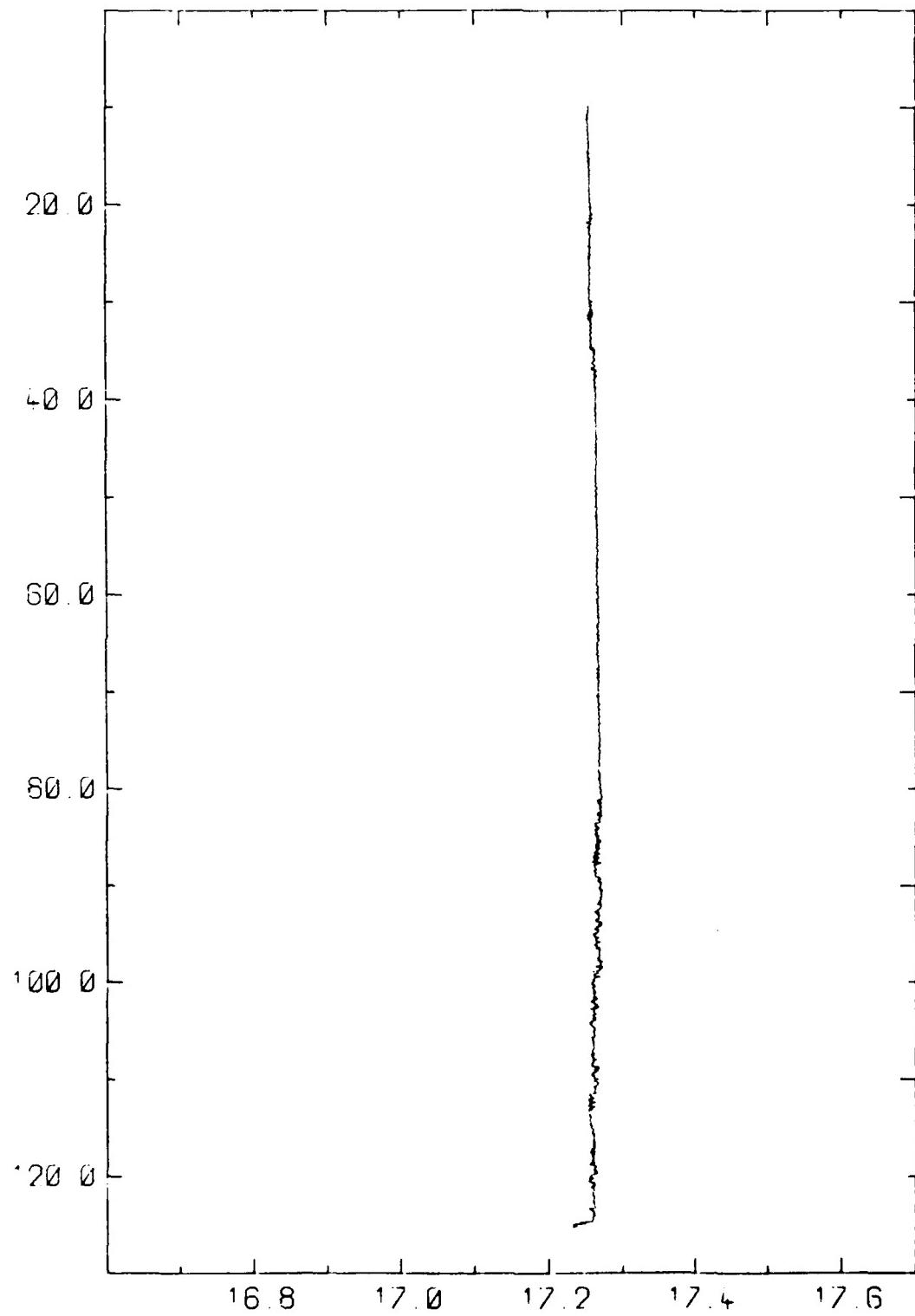
30 DEG/M



DATE 1/25/80
TIME 1825 GMT

64

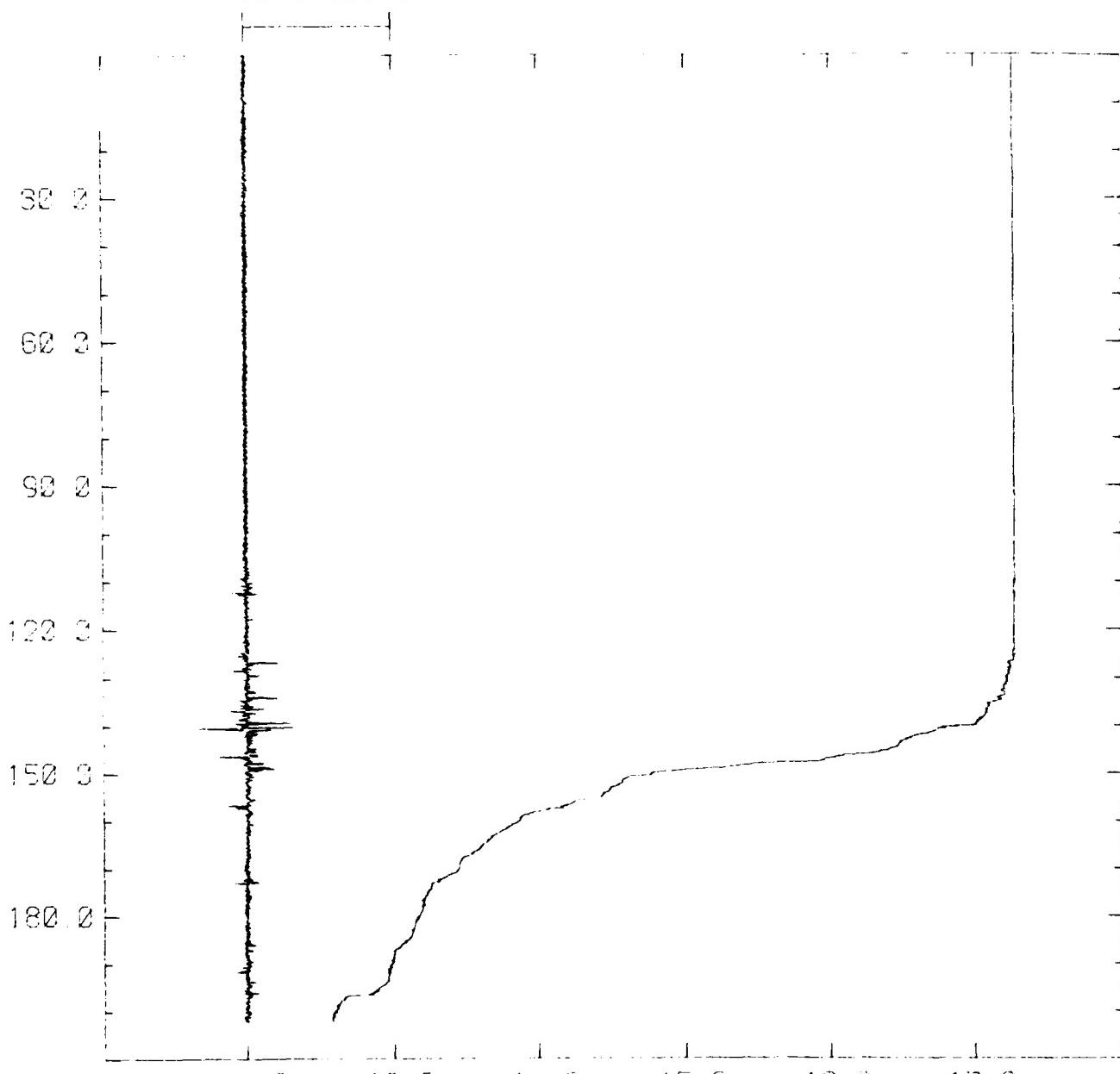
TAPE F5A FILE 1
UNIT 2.79



DATE 1/25/80
TIME 1825 GMT

TAPE FSA FILE 2
UNIT 2.79

IC 8 DEC/M

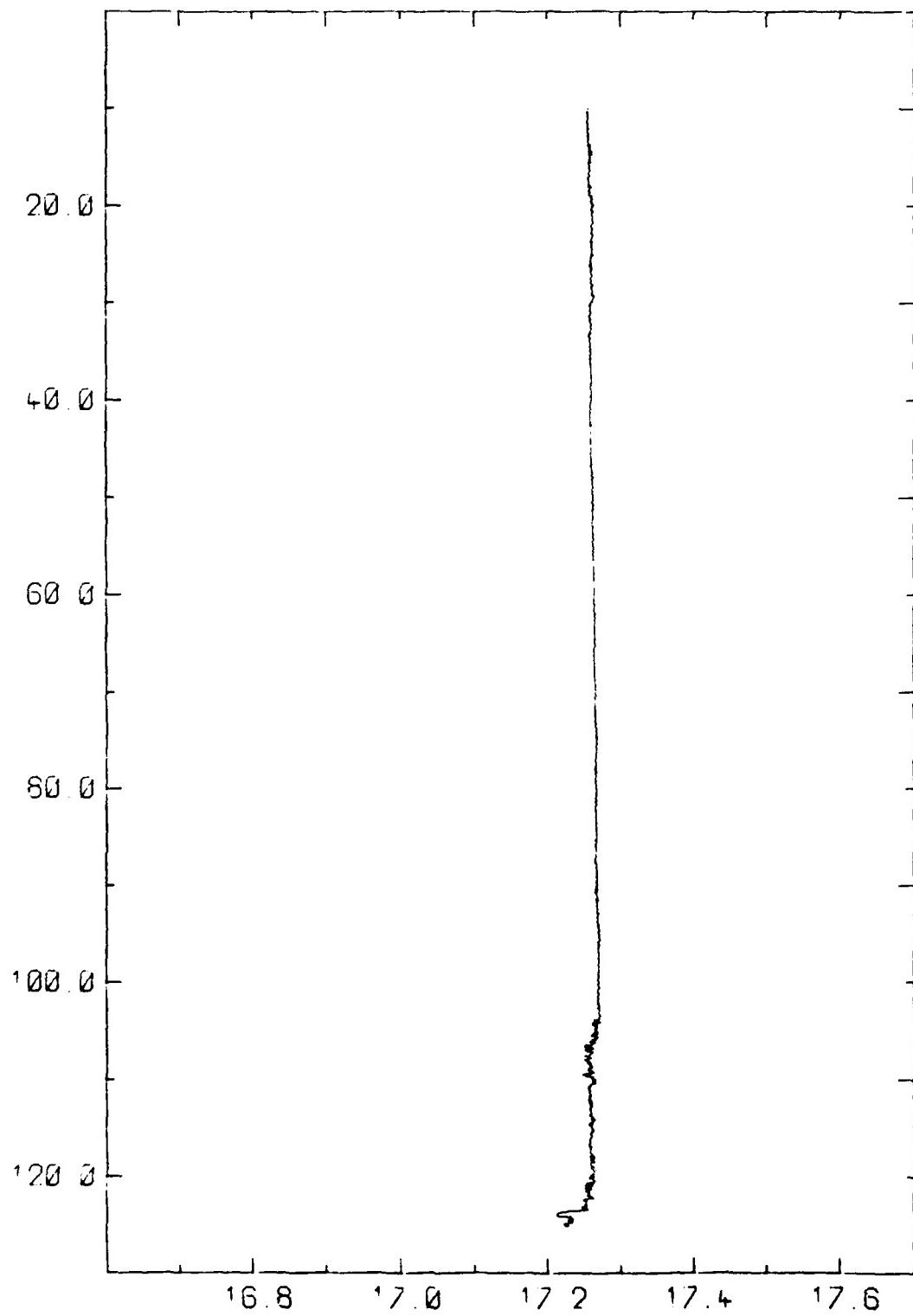


DATE 1725/80

TIME 1925 GMT

66

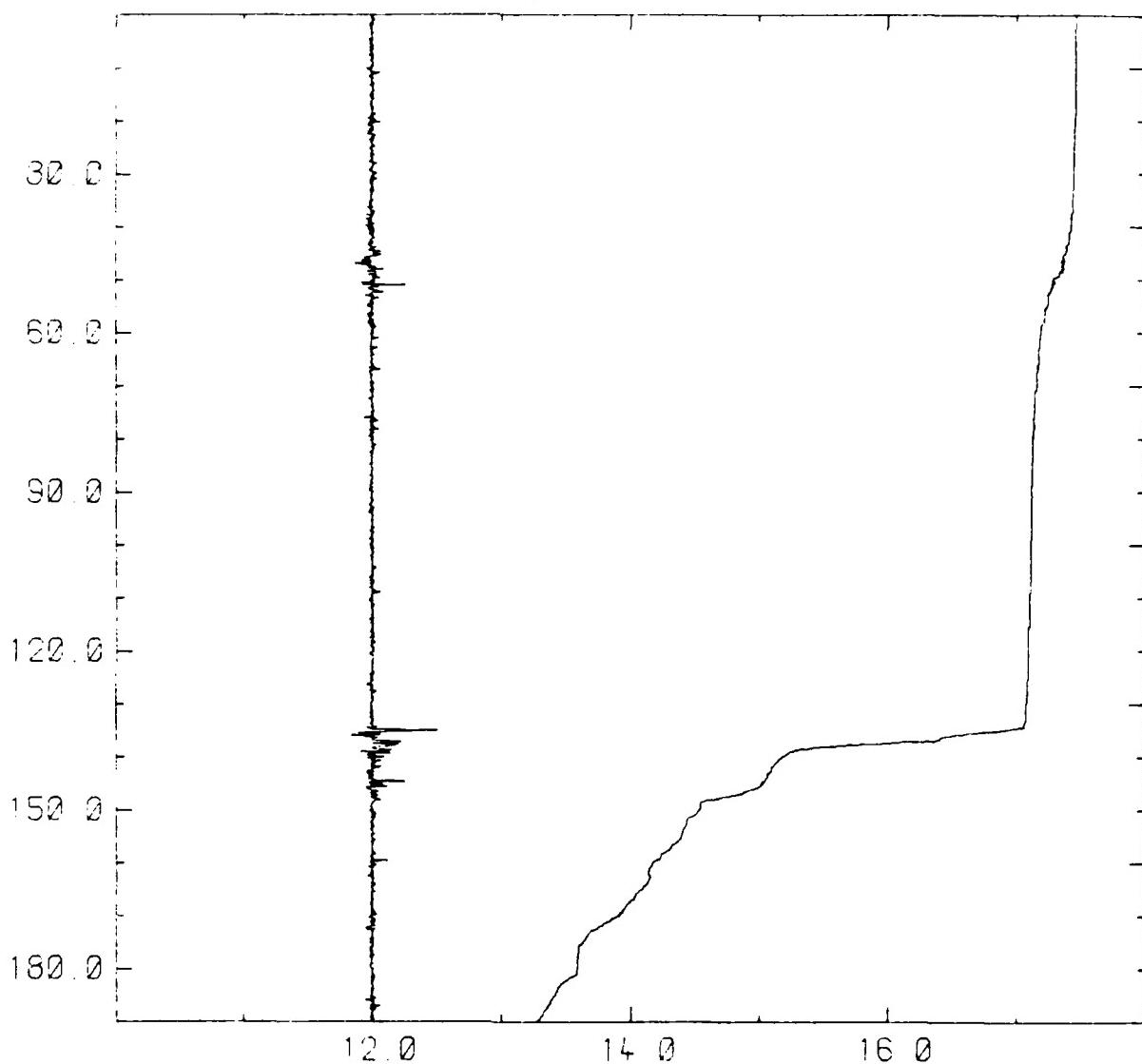
TAPE F5A FILE 2
UNIT 2.79



DATE 1/25/60
TIME 1905 GMT

TAPE F5B FILE 1
UNIT 2 79

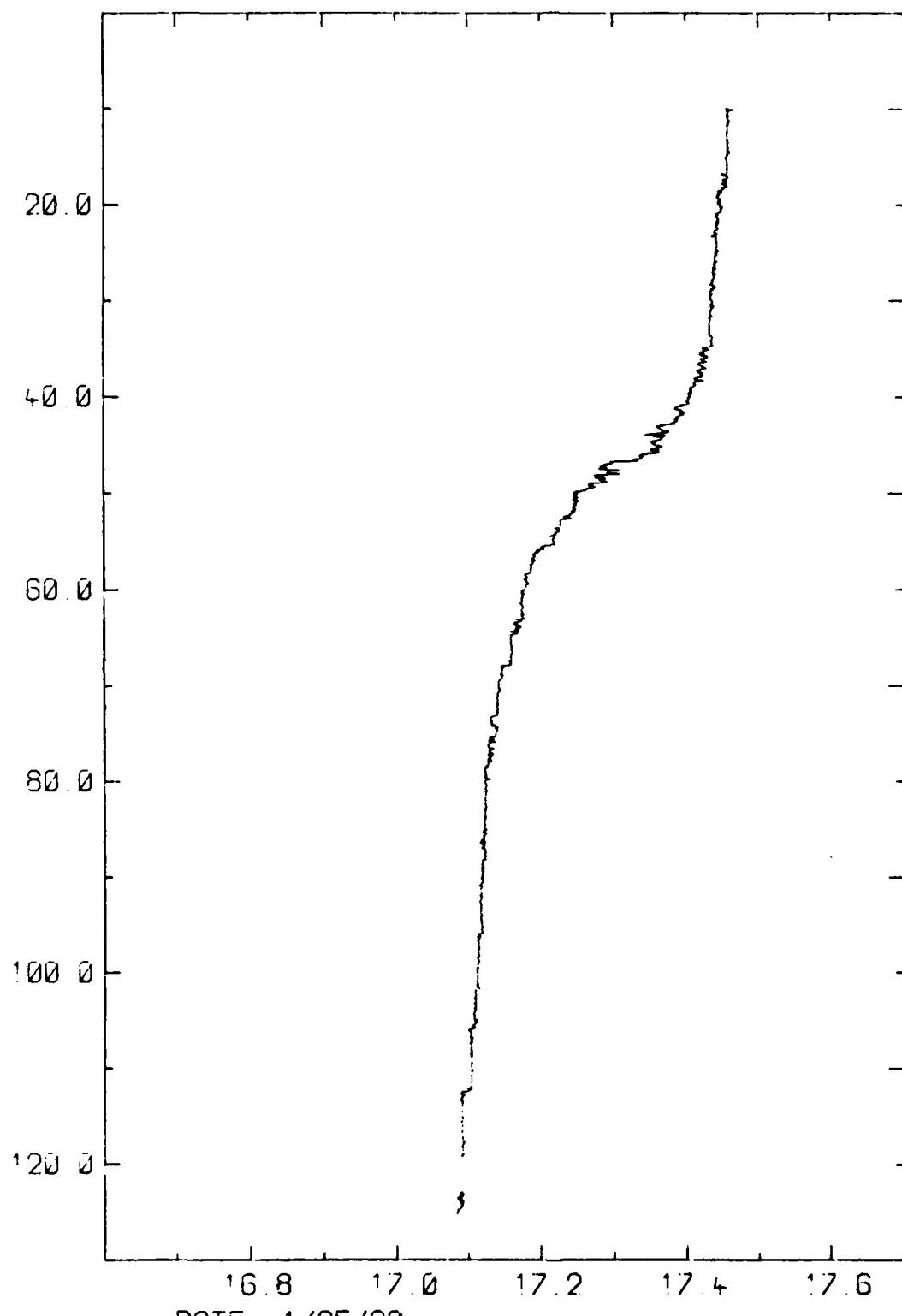
10.0 DEG/M



DATE 1/25/80
TIME 2240 GMT

68

TAPE F5B FILE 1
UNIT 2.79



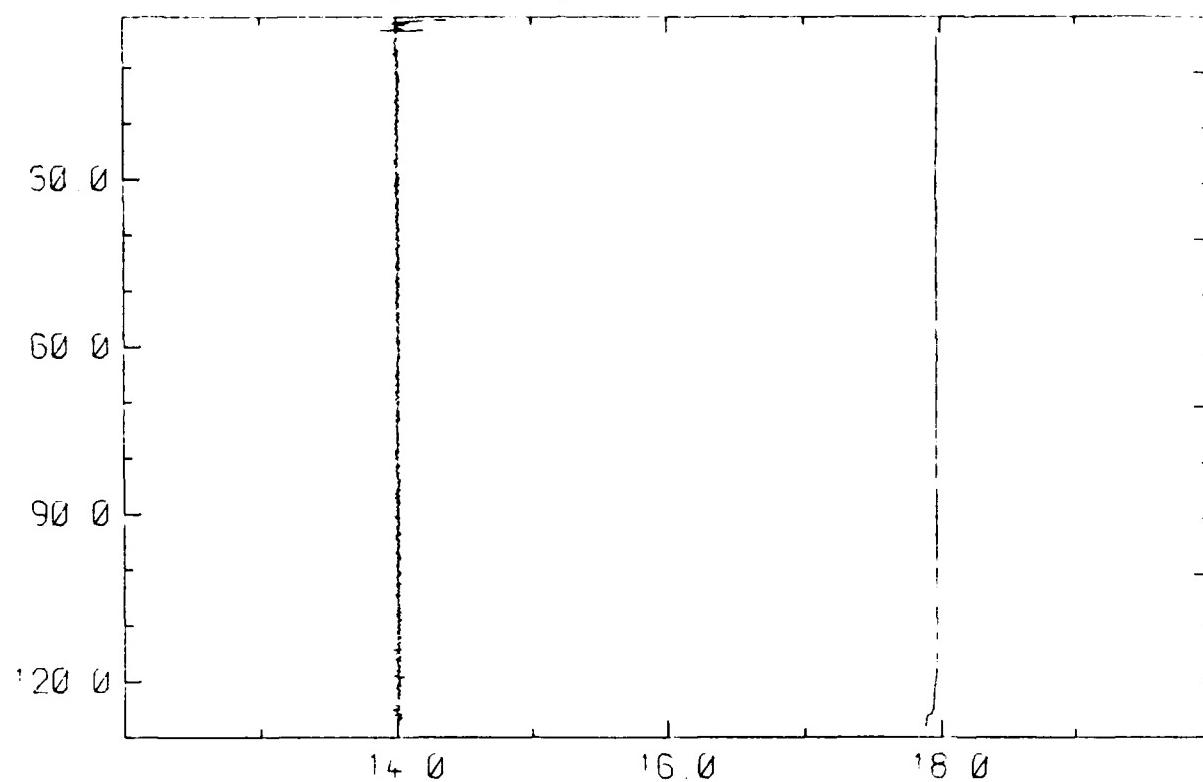
DATE 1/25/80

TIME 2040 GMT

TAPE F5B FILE 2
UNIT 2.79

69

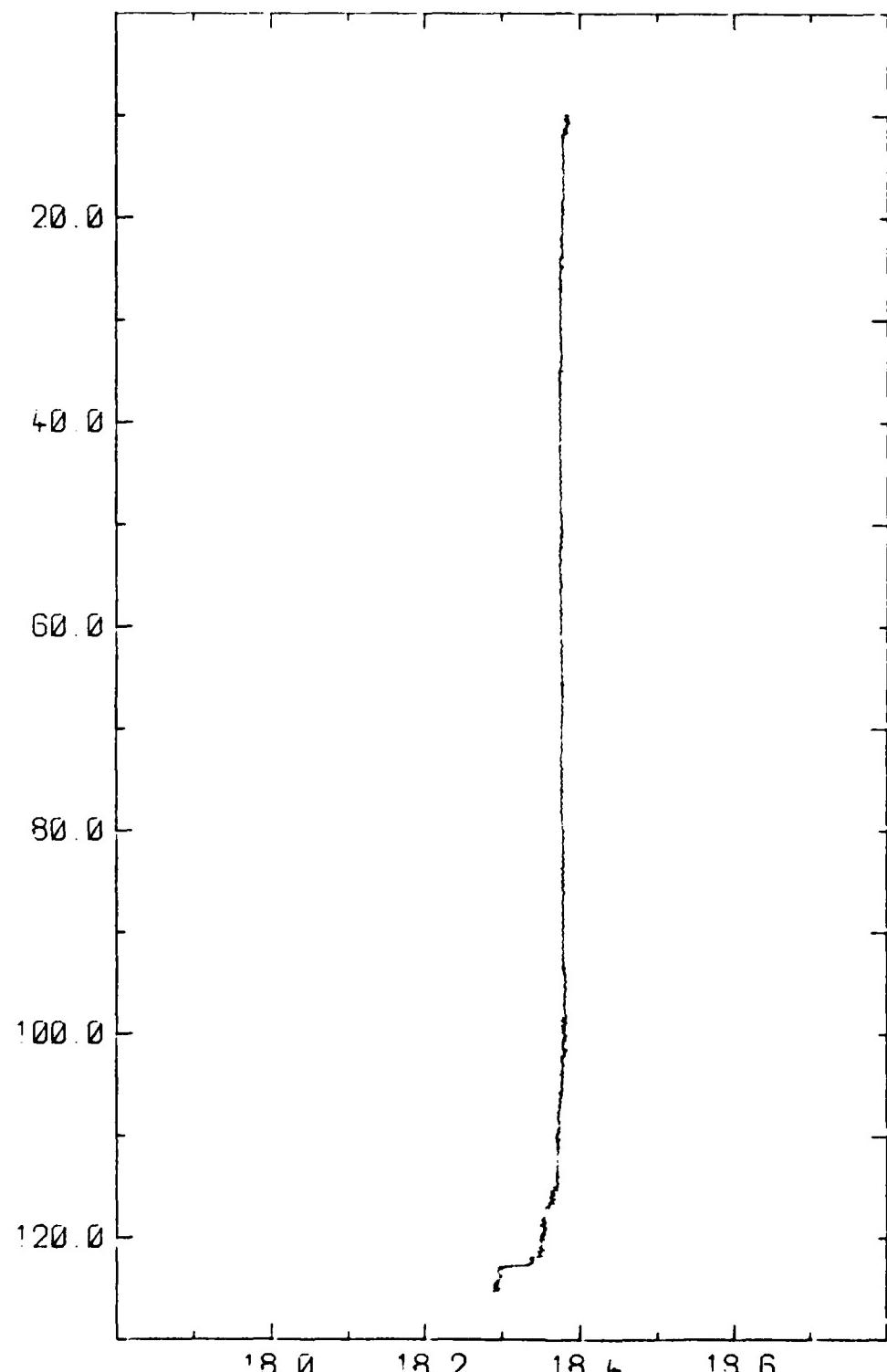
10.0 DEG/M



DATE 1/25/80
TIME 2110 GMT

70

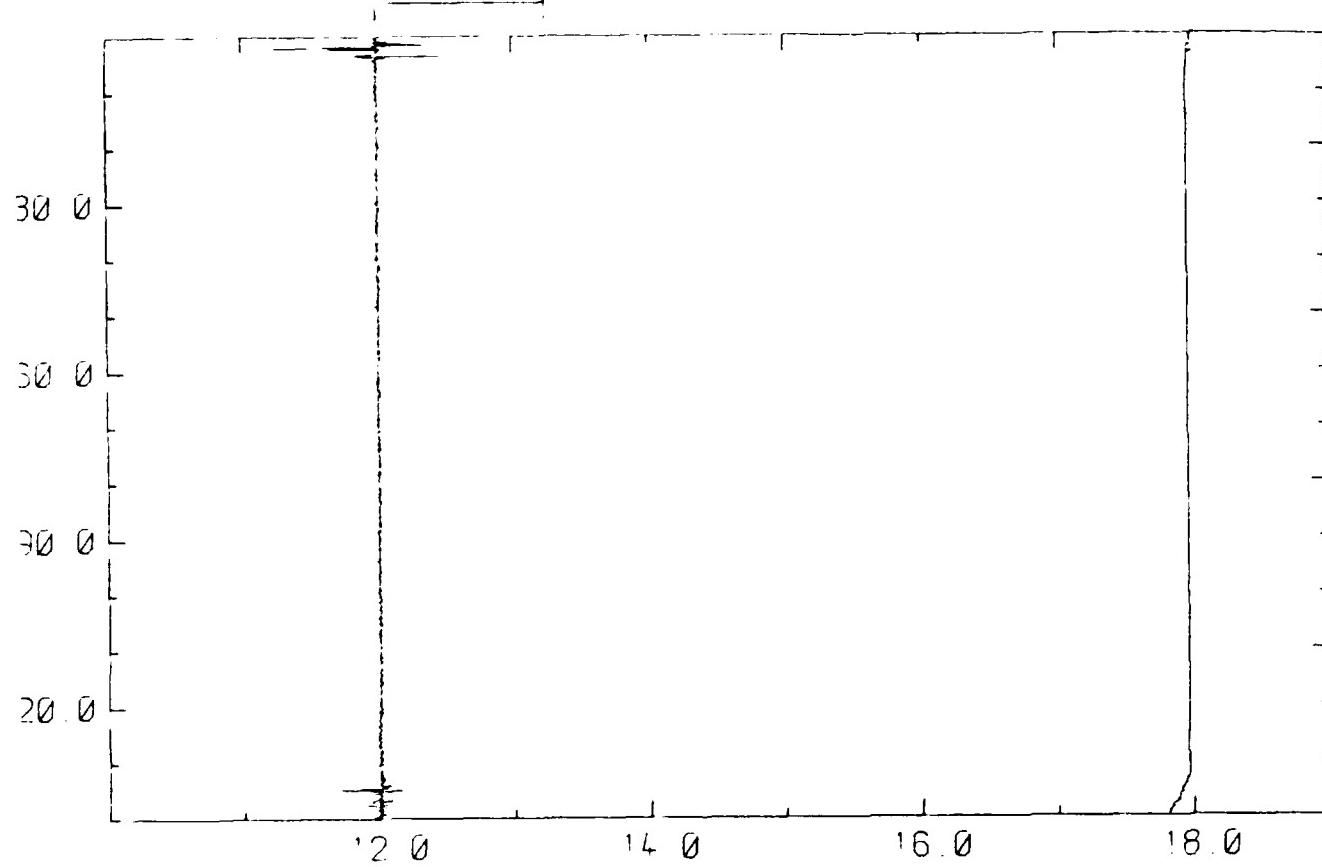
TAPE F5B FILE 2
UNIT 2 79



DATE 1/25/80
TIME 2110 GMT

TAPE F5L FILE 1
UNIT 2 /9

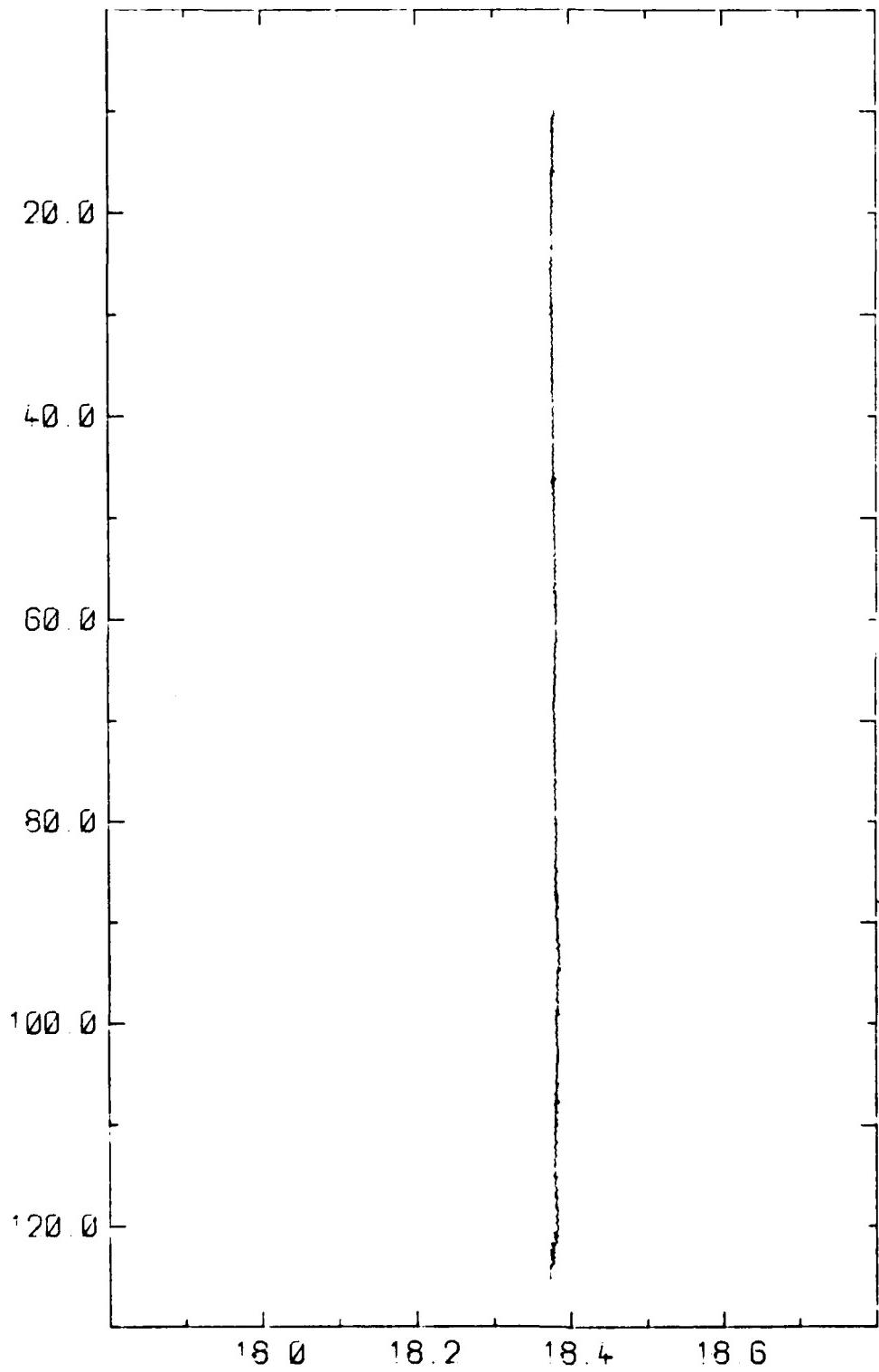
100 DEG/M



DATE 1/25/80
TIME 2247 GMT

72

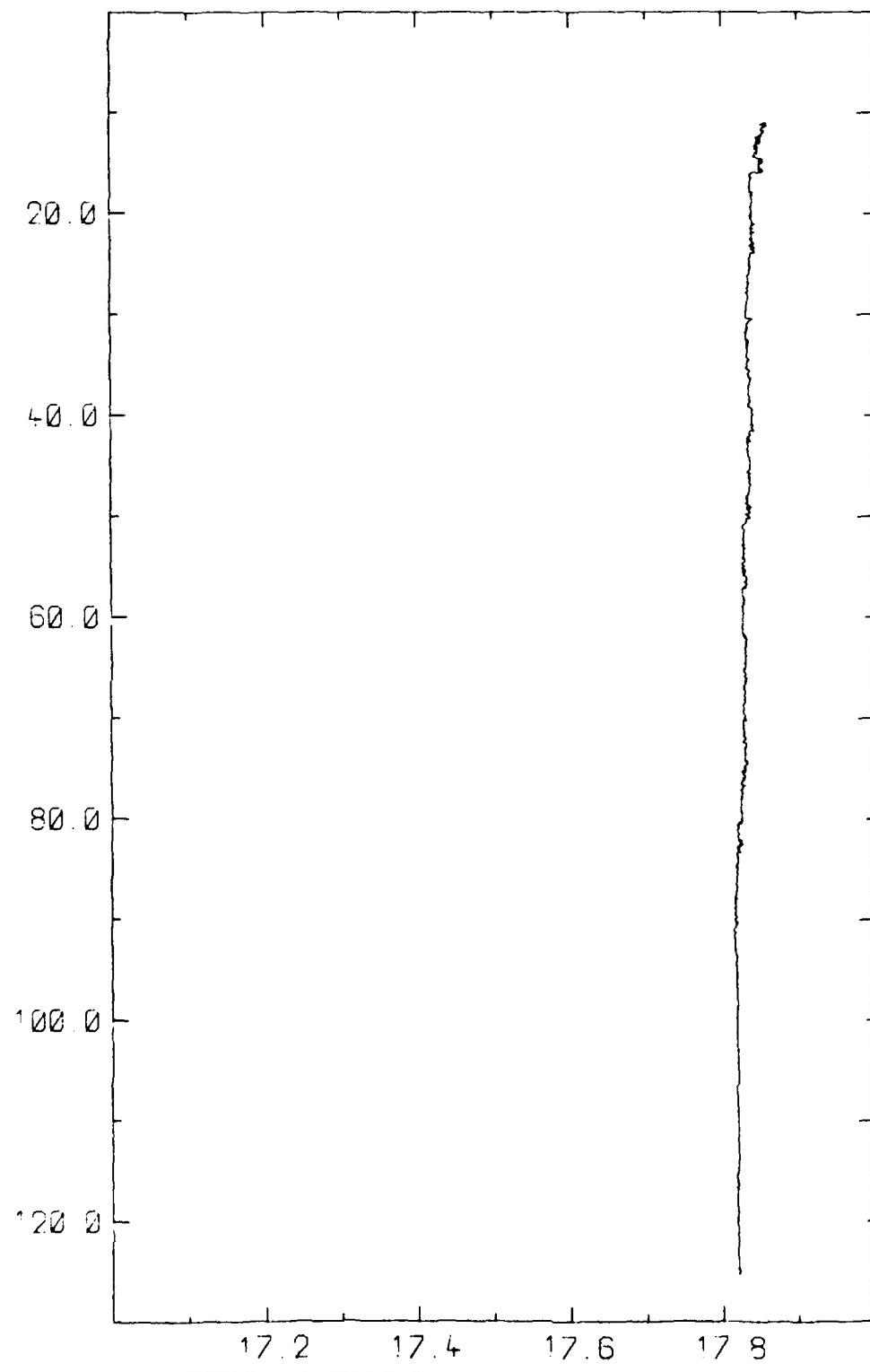
TAPE F5C FILE 1
UNIT 2.79



DATE 1/25/80
TIME 2247 GMT

TAPE F5C FILE 3
UNIT 2.79

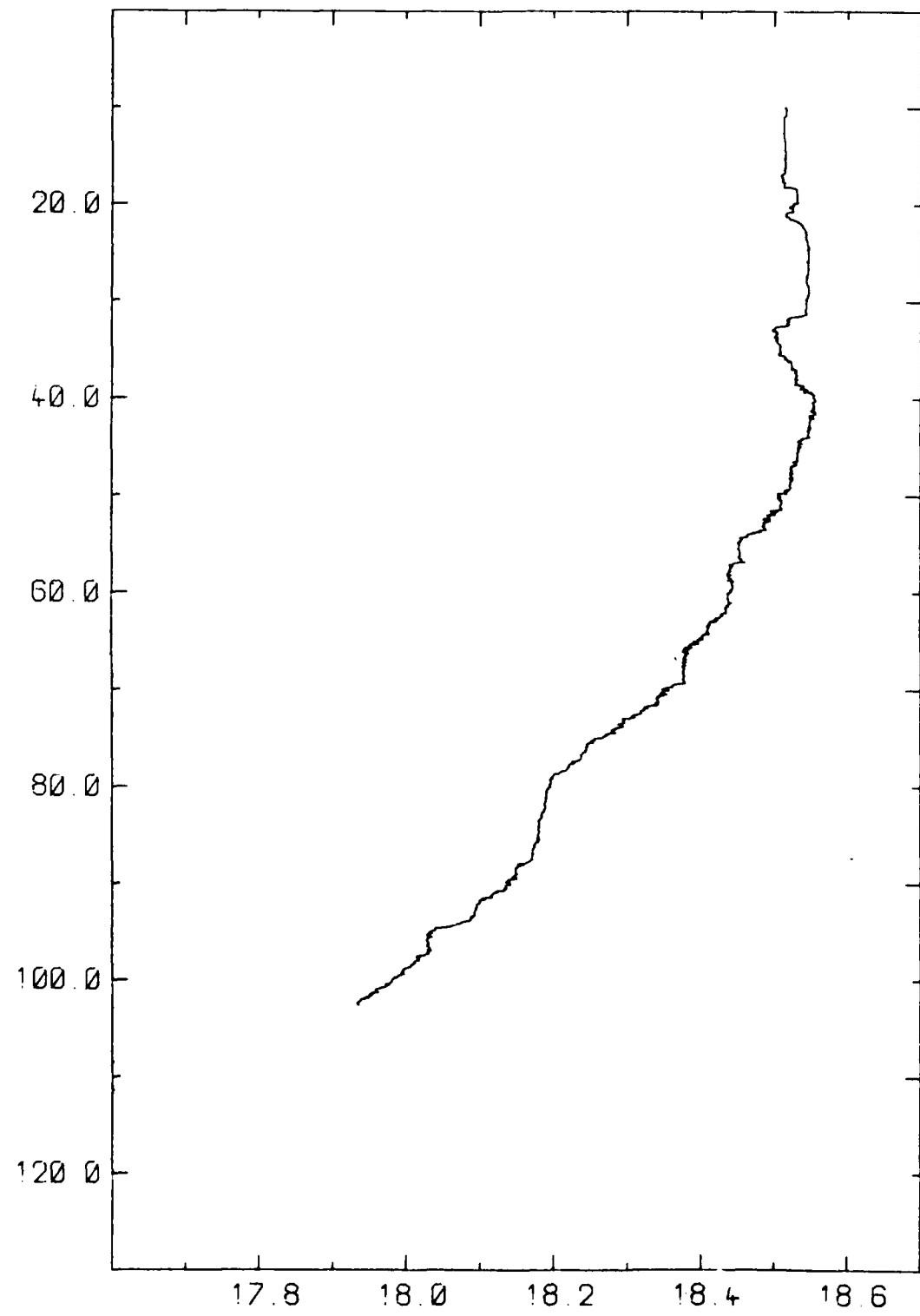
73



DATE 1/26/80
TIME 0054 GMT

74

TAPE F5E FILE 2
UNIT 2.79

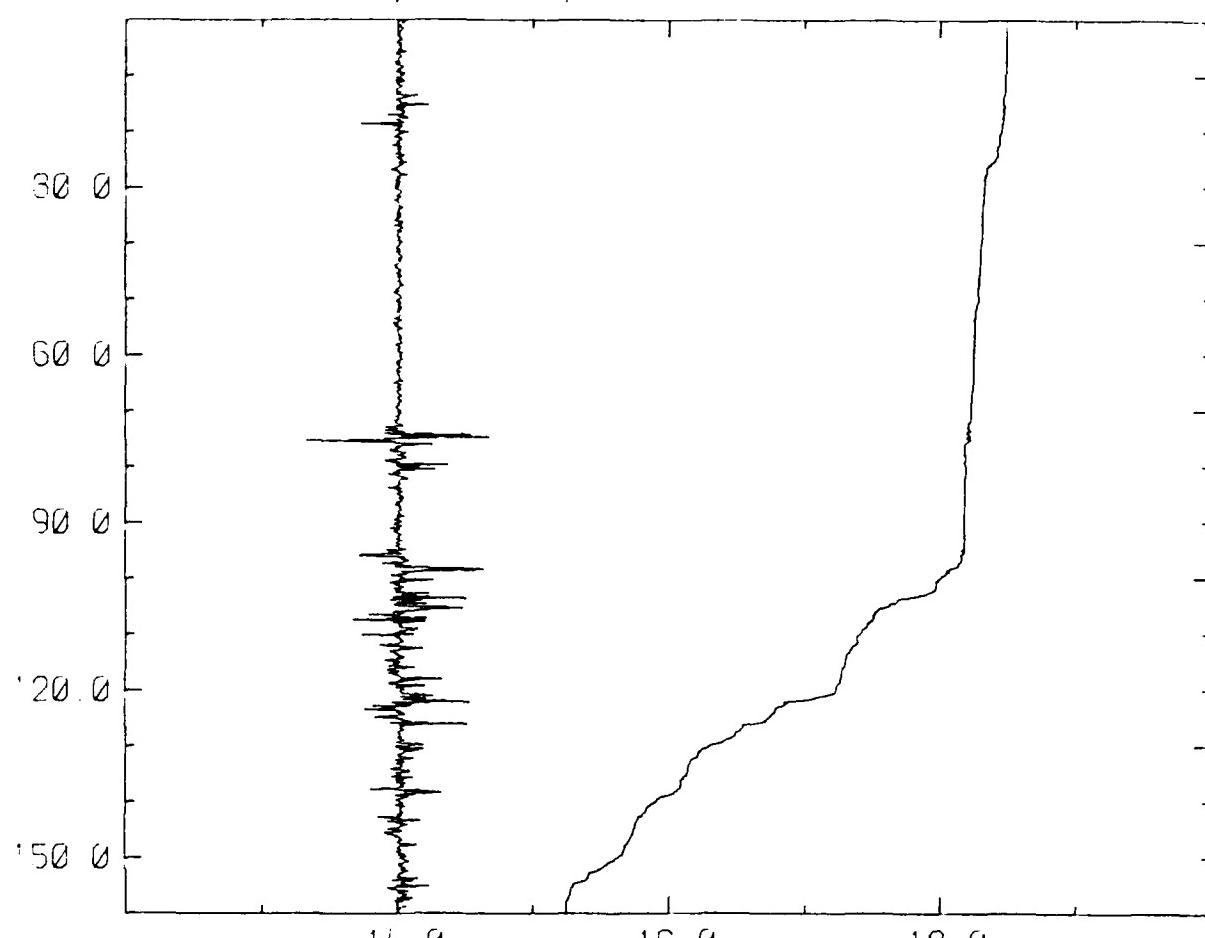


DATE 1/26/80
TIME 0551 GMT

TAPE FGR FILE 4
UNIT 2.29

75

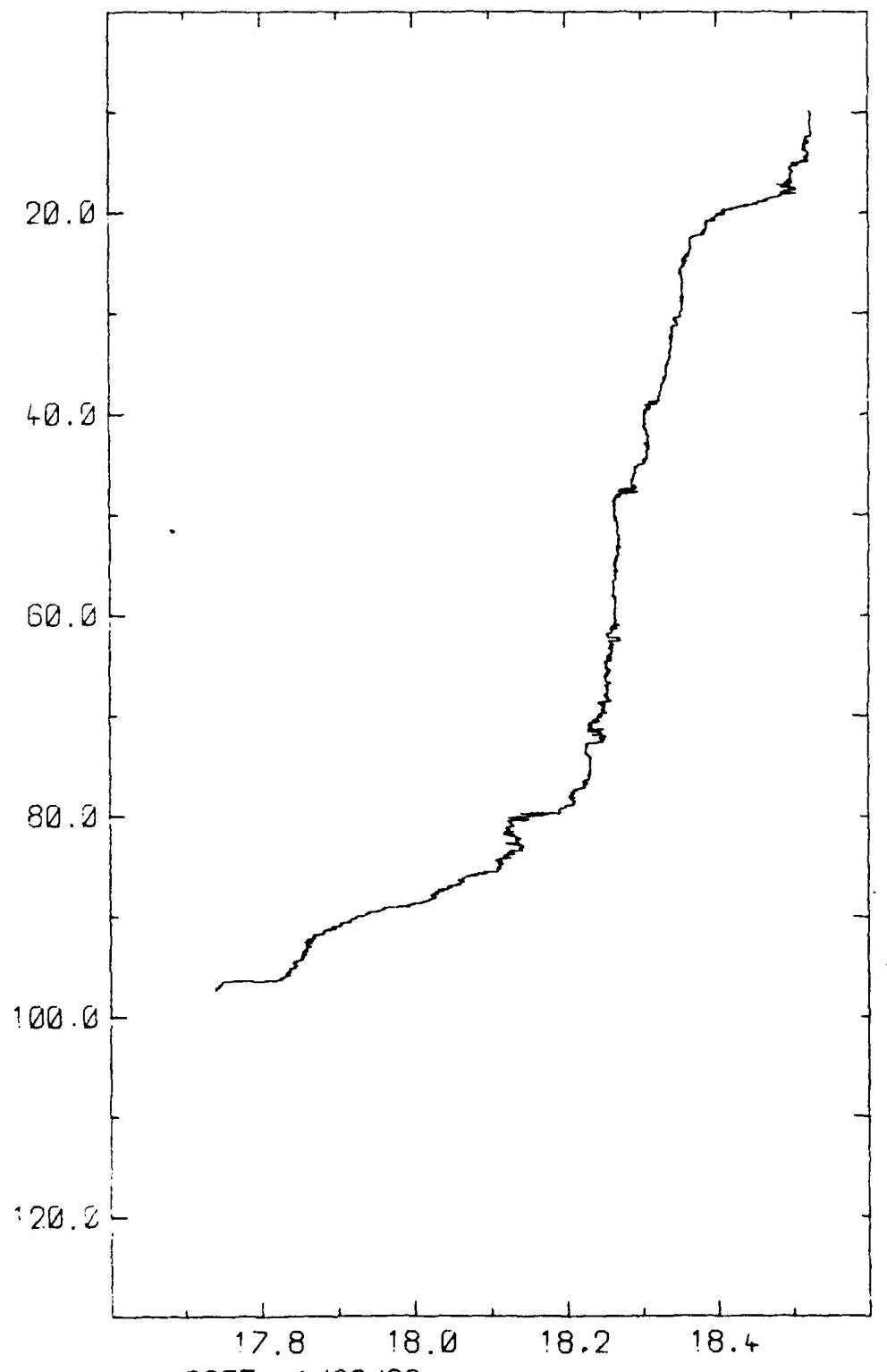
3.0 DEG/M



DATE 1/26/80
TIME 2035 GMT

76

TAPE F6B FILE 1
UNIT 2.79



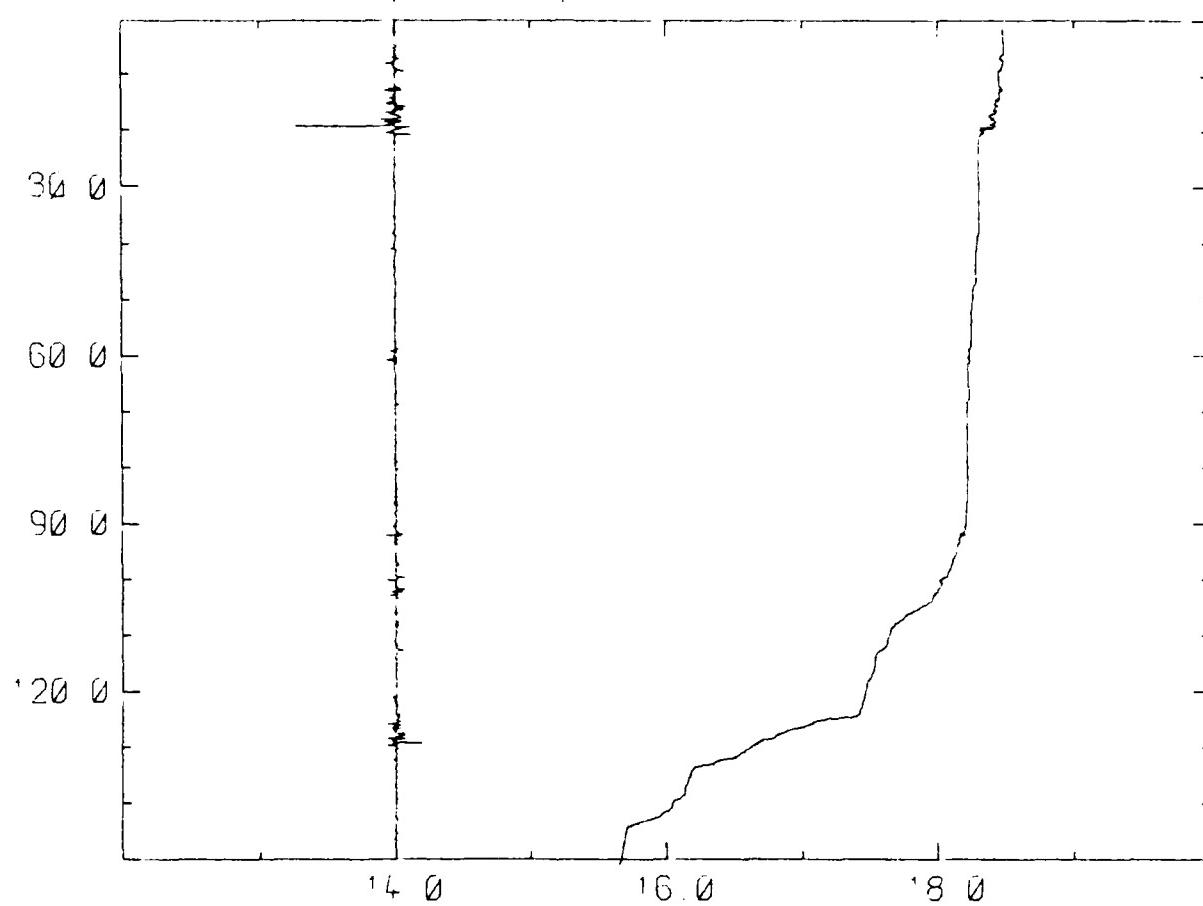
DATE 1/26/80

TIME 2102 GMT

TAPE F6C FILE 1
UNIT 2 79

77

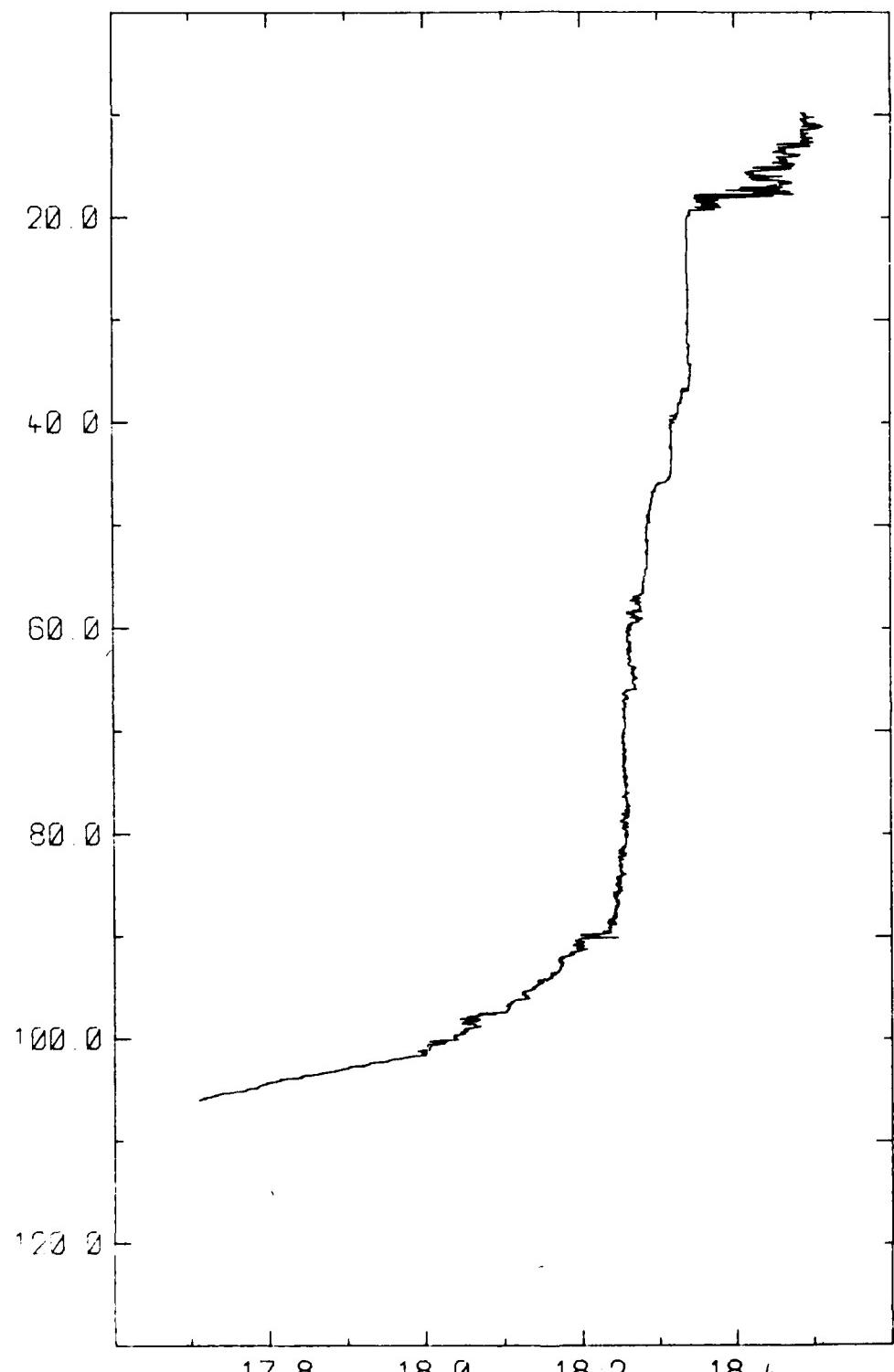
30 0 DEG/M



DATE 1/26/80
TIME 2140 GMT

78

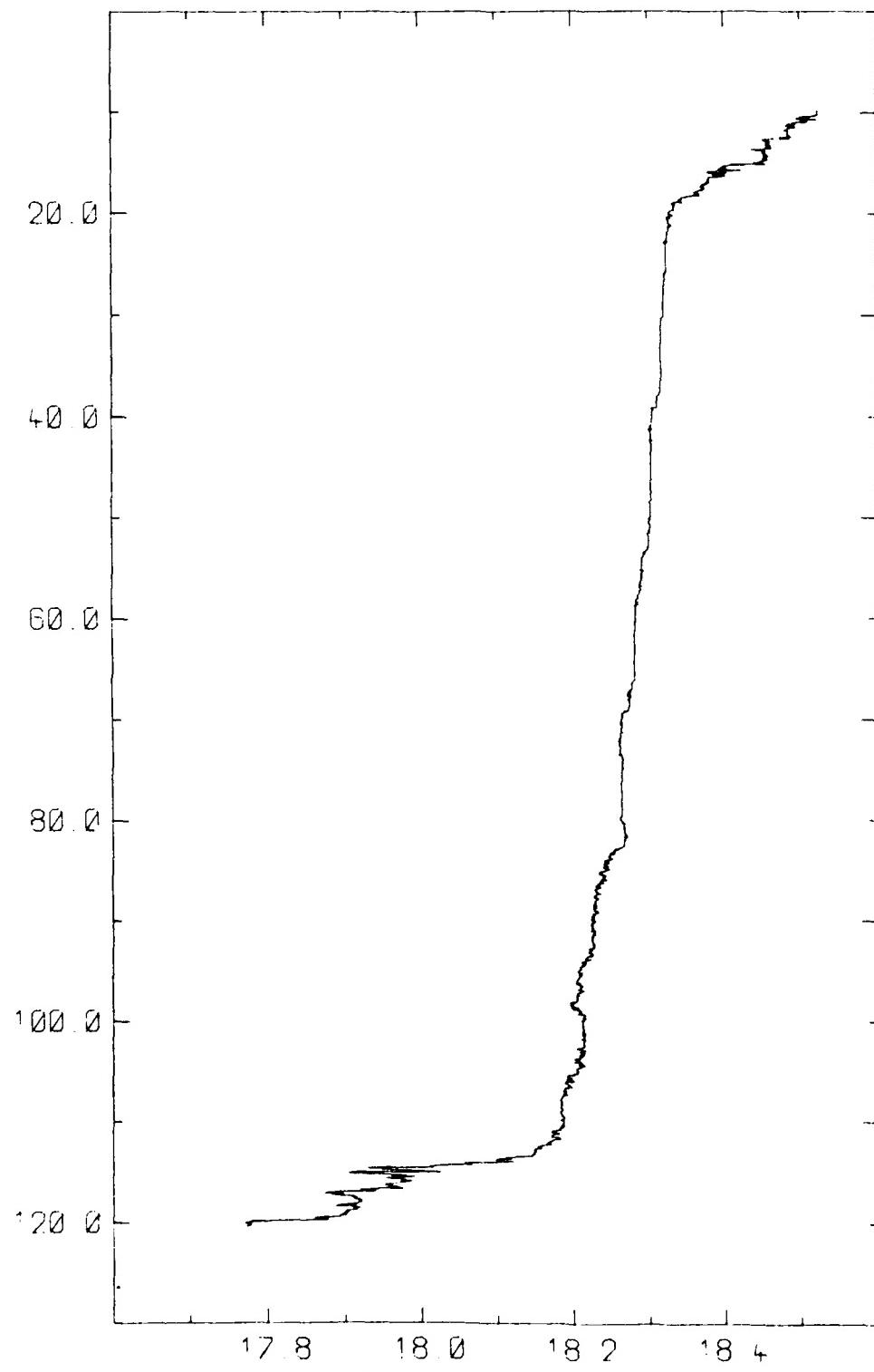
TAPE F6C FILE 1
UNIT 2.79



DATE 1/26/80
TIME 2140 GMT

TAPE F6C FILE 3
UNIT 2.79

79

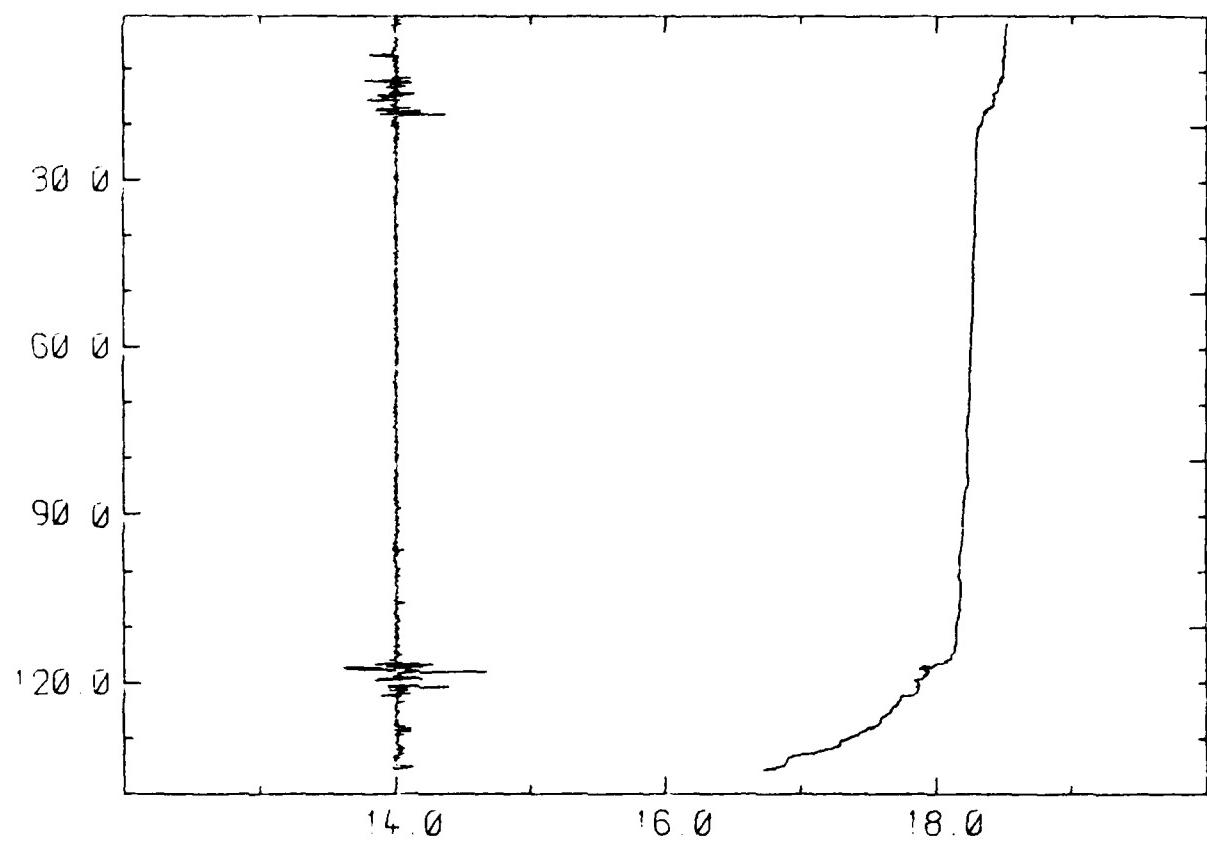


DATE 1/26/80
TIME 2303 GMT

80

TAPE F6C FILE 3
UNIT 2.79

10.0 DEG/M

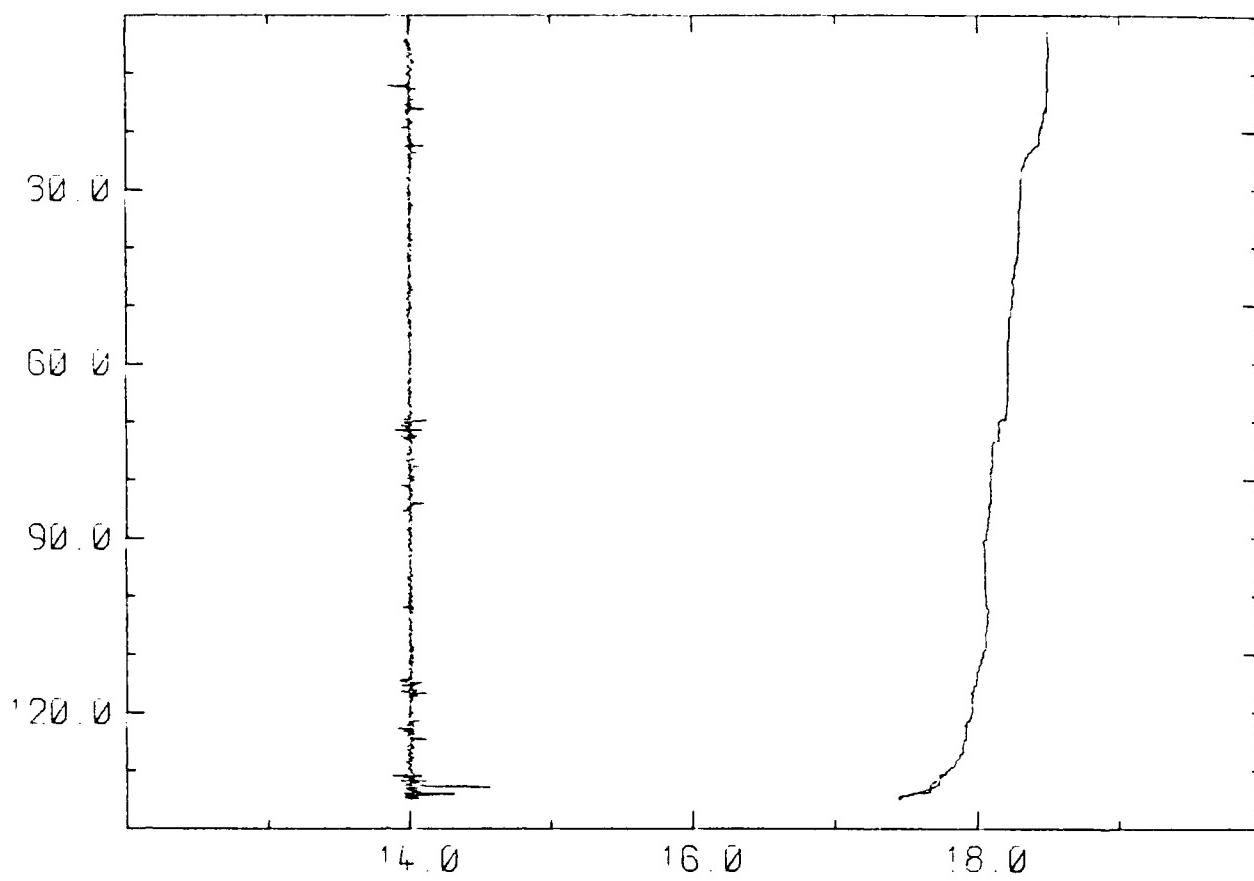


DATE 1/26/80
TIME 2303 GMT

TAPE F6D FILE 1
UNIT 2.79

81

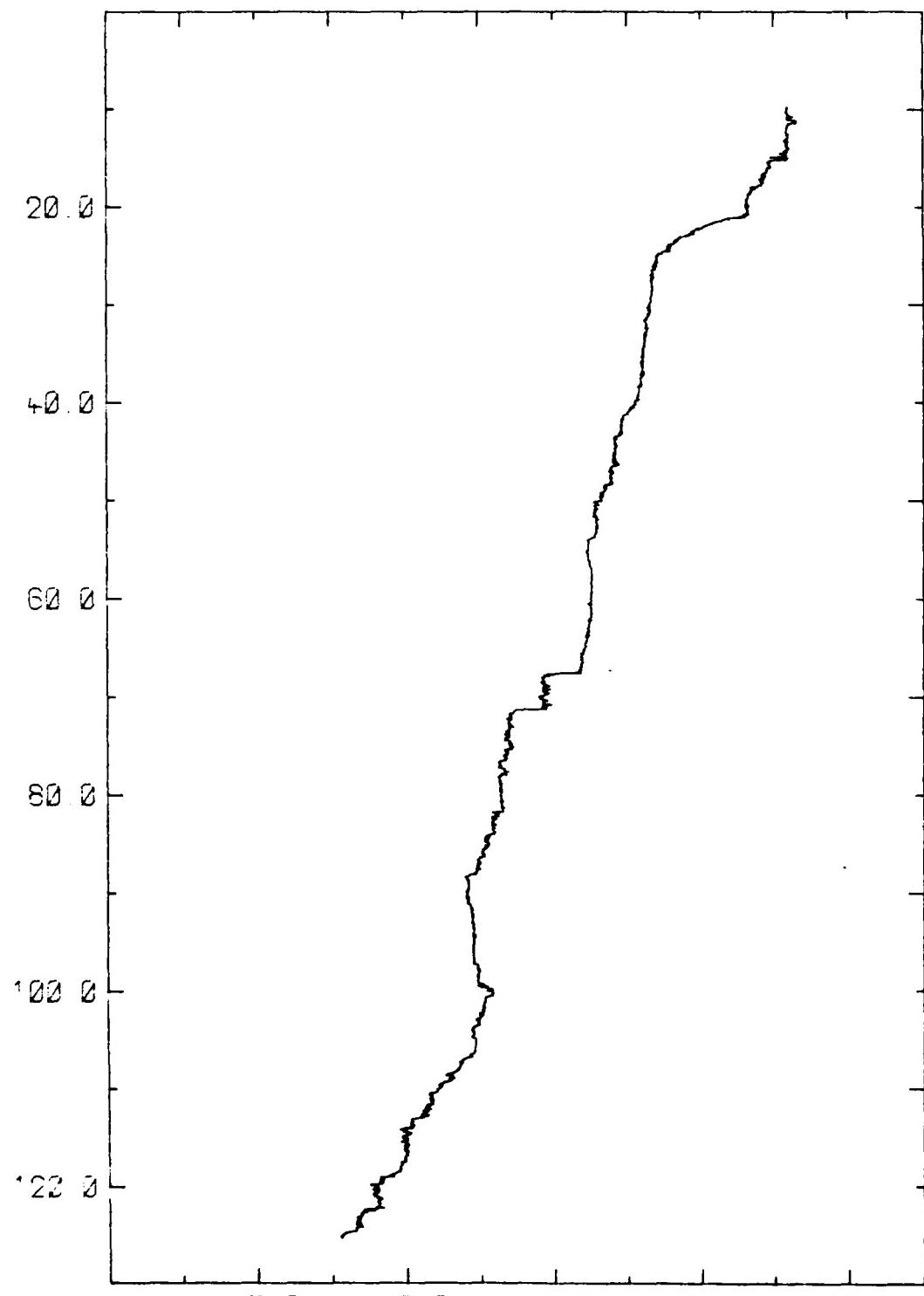
10.0 DEG/M



DATE 1/26/80
TIME 2334 GMT

82

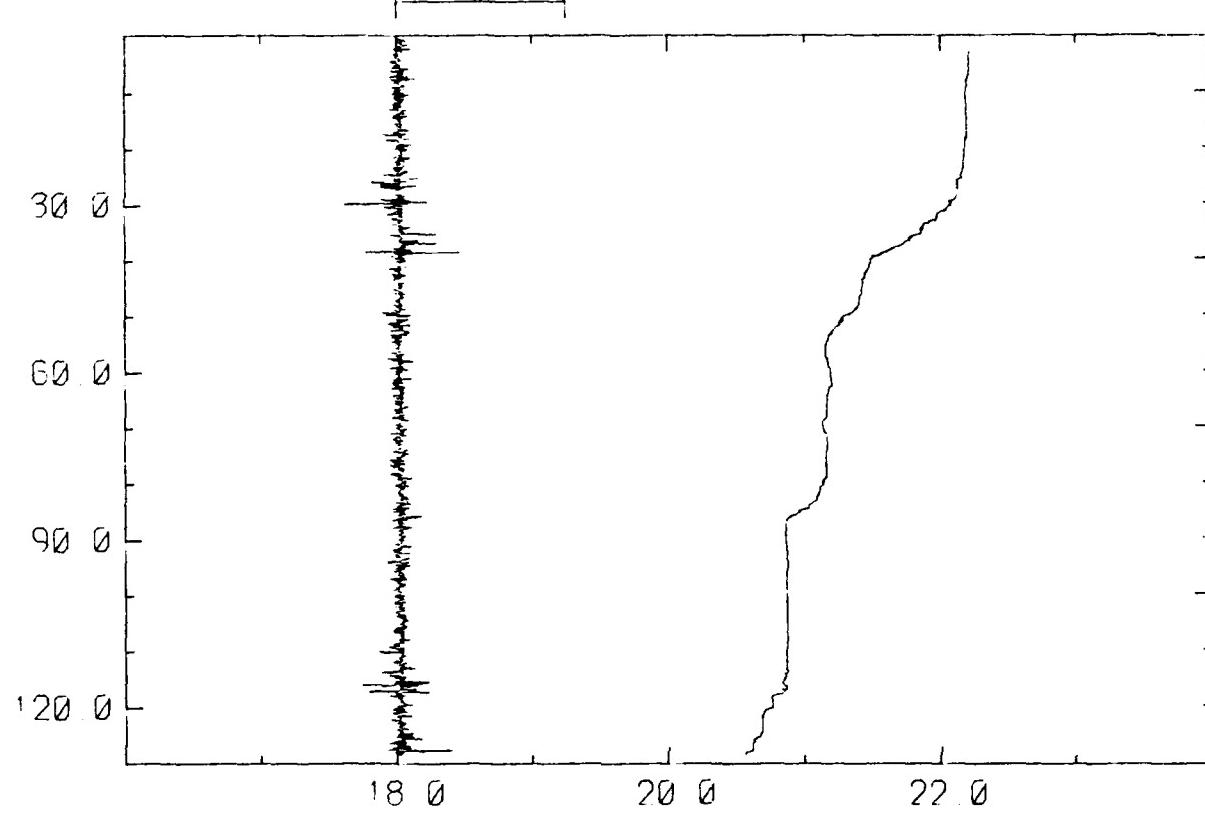
TAPE F6D FILE 1
UNIT 2.79



DATE 1/26/80
TIME 2334 GMT

TAPE F6D FILE 2
UNIT 2 /9

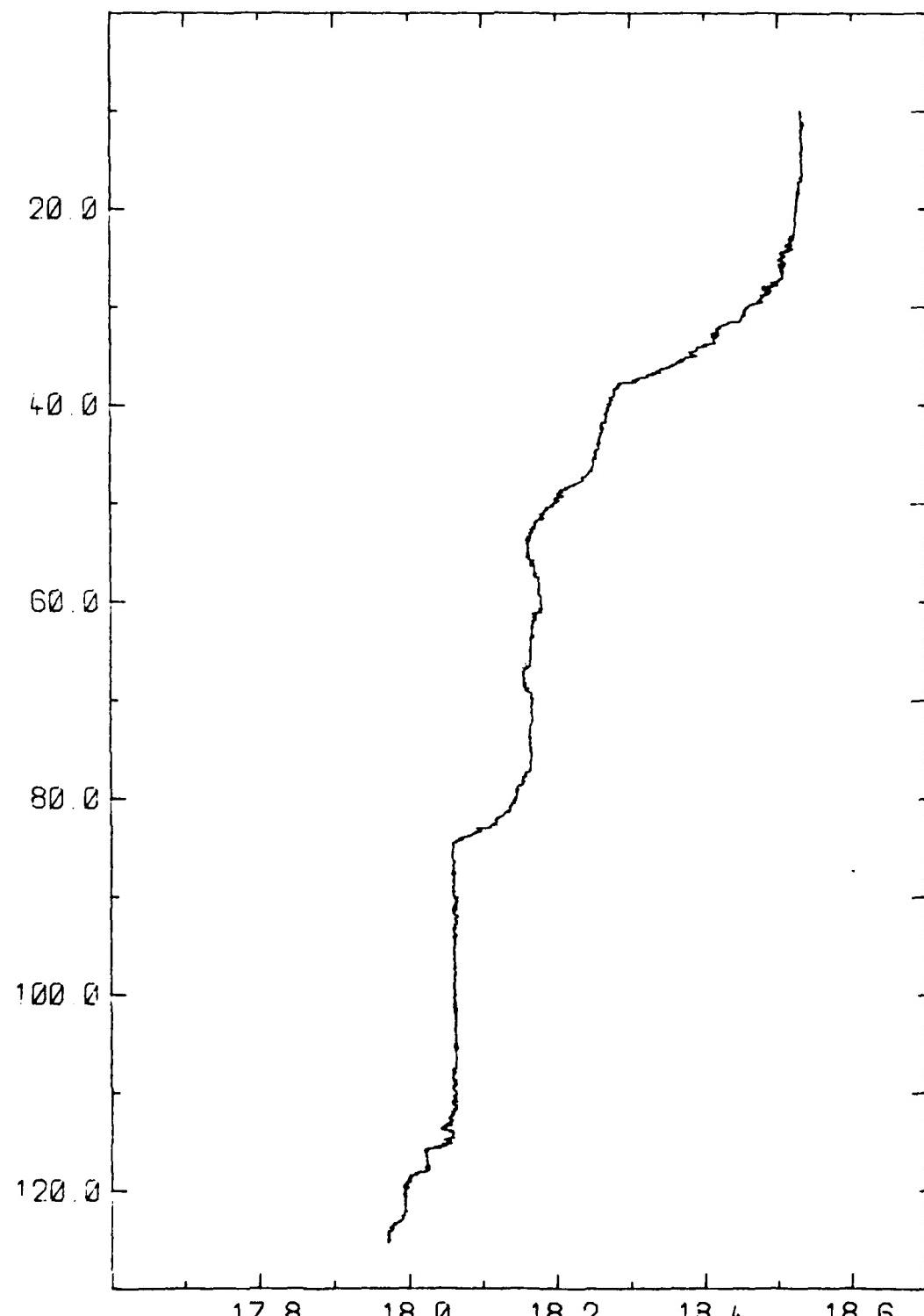
30 DEG/M



DATE 1/27/80
TIME 0021 GMT

84

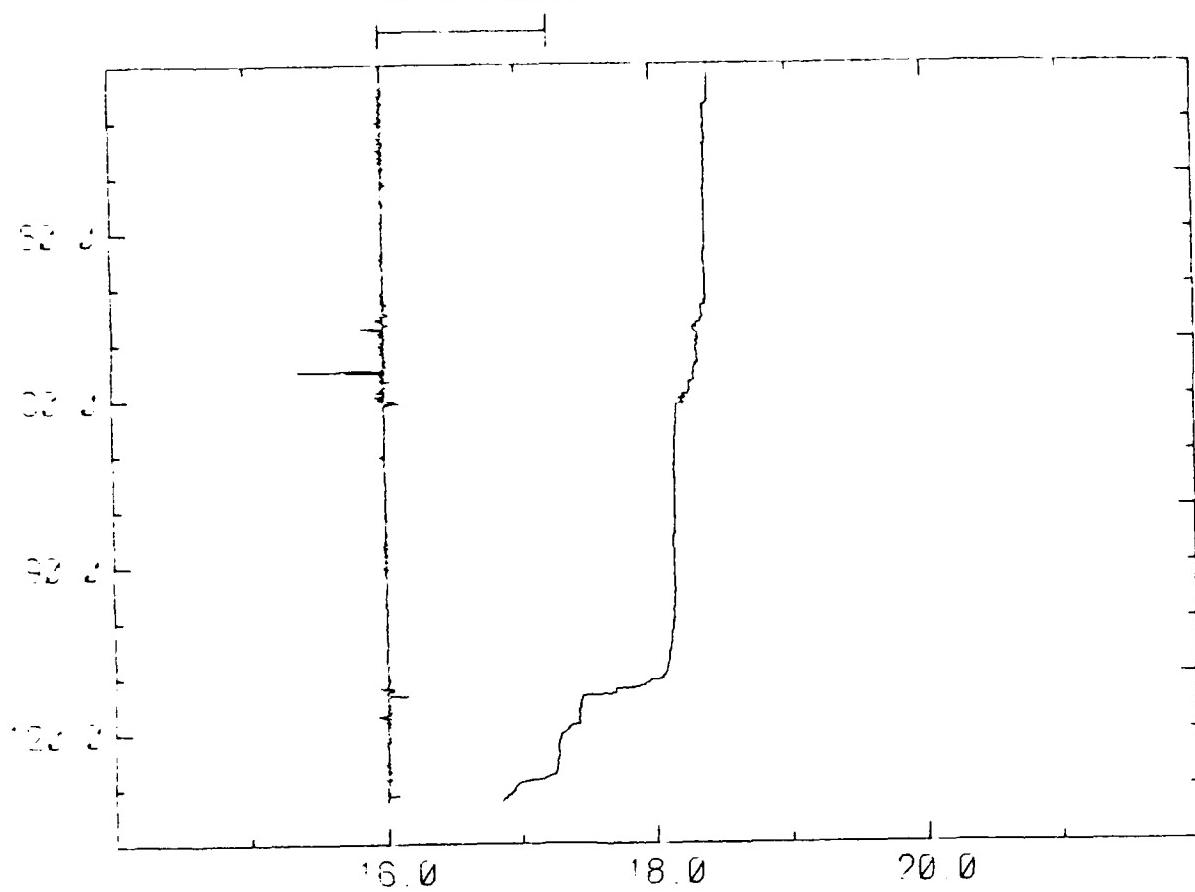
TAPE F6D FILE 2
UNIT 2.79



DATE 1/27/80
TIME 0021 GMT

TAPE F7A FILE 1
UNIT 2 /9

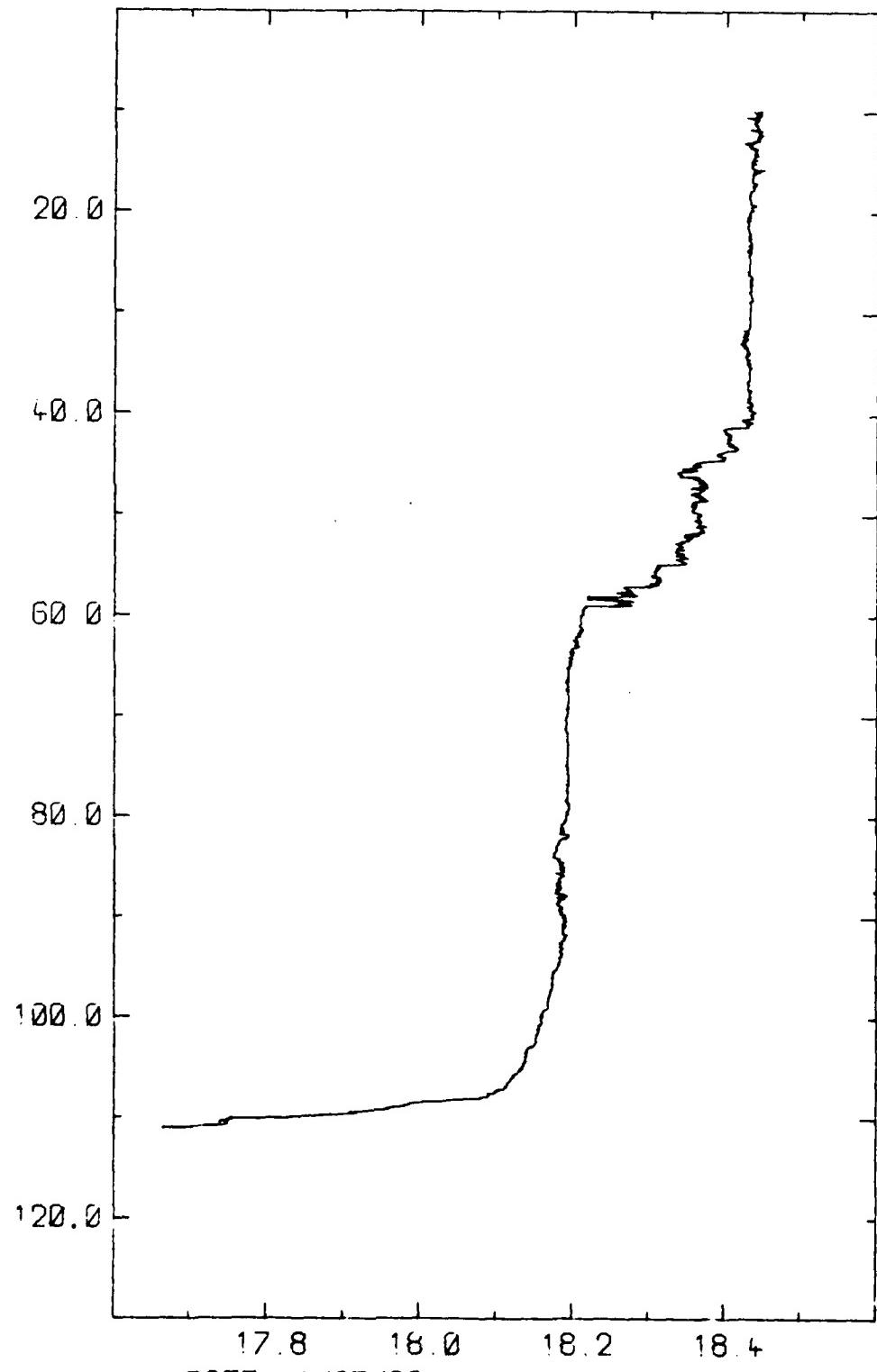
30.0 DEG/M



DATE 1/27/80
TIME 0212 GMT

86

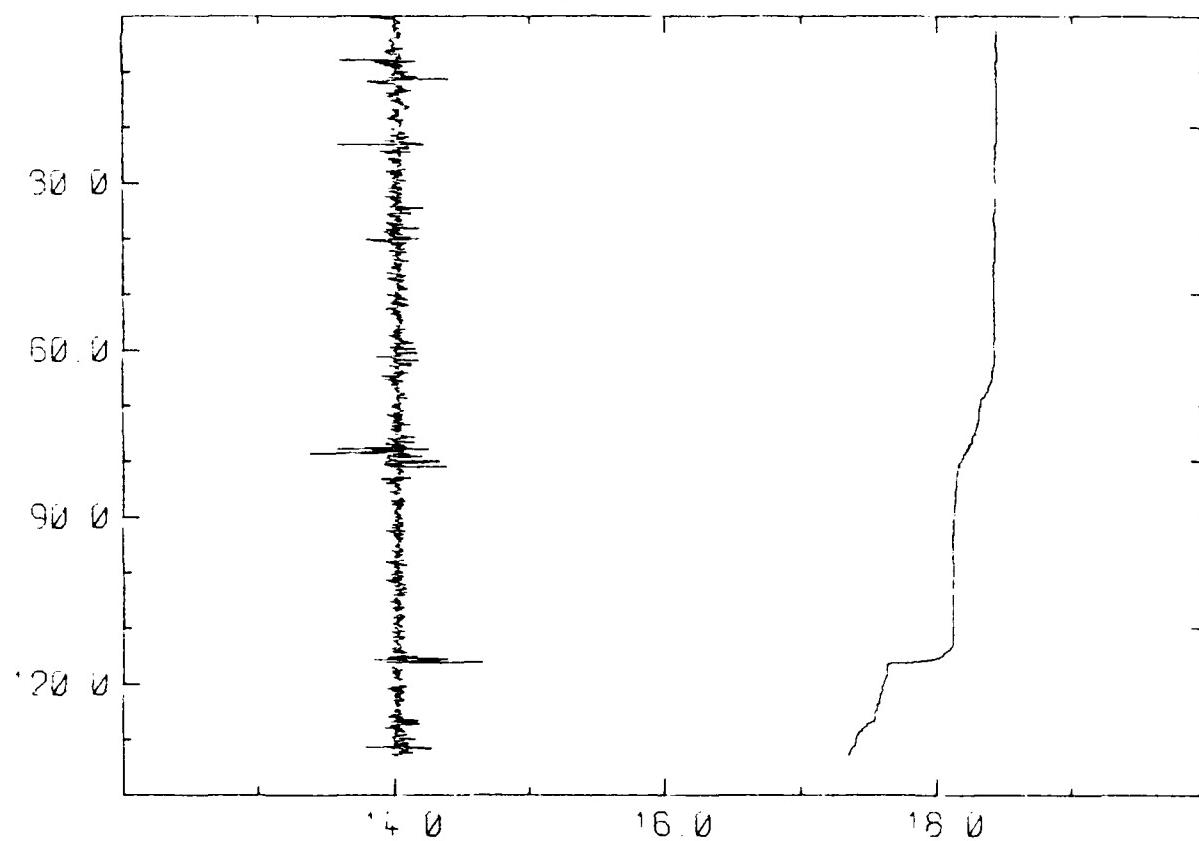
TAPE F7A FILE 1
UNIT 2.79



DATE 1/27/80
TIME 0212 GMT

TAPE F7A FILE 2
UNIT 279

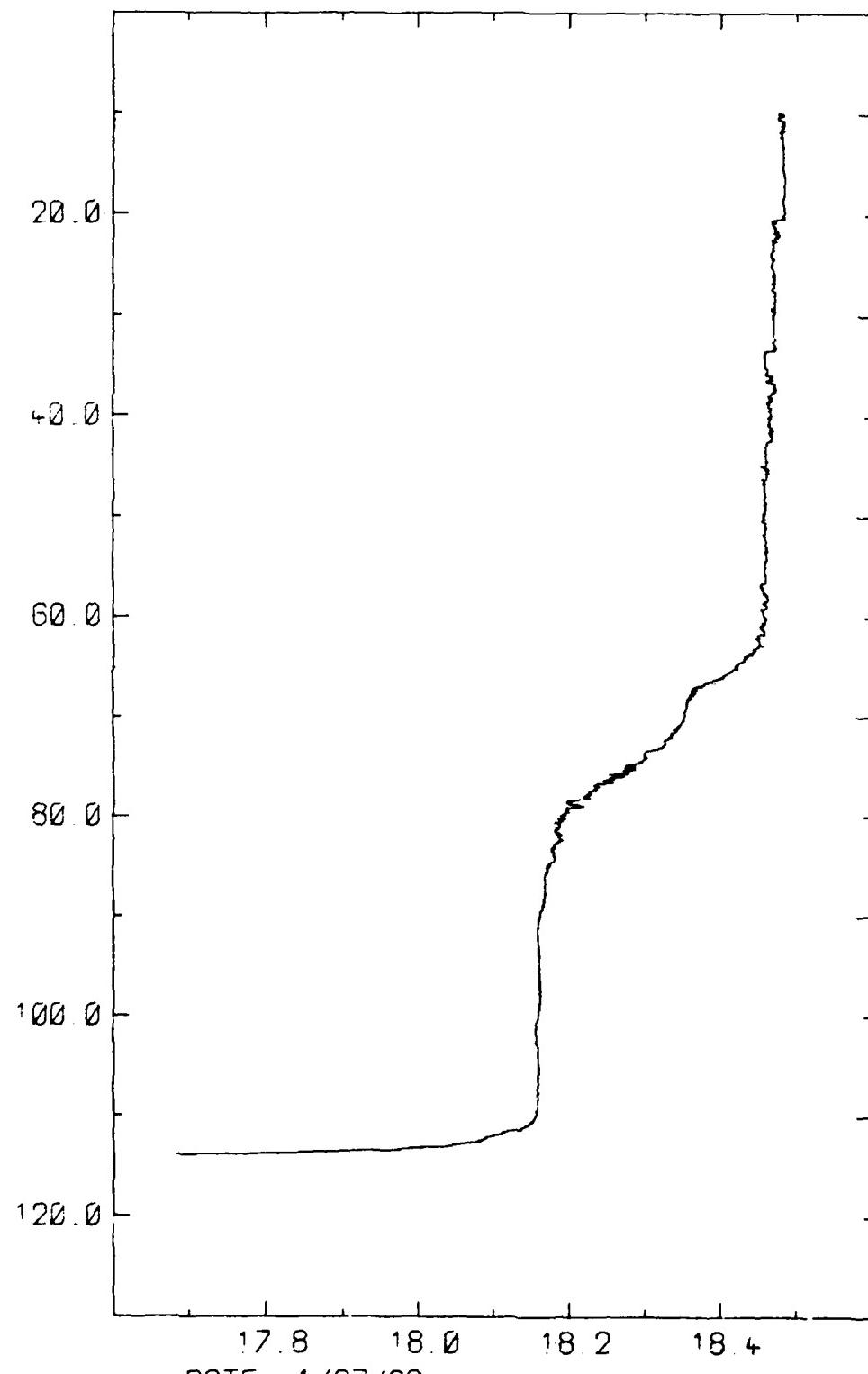
30 DEG/M



DATE 1/27/80
TIME 0239 GMT

88

TAPE F7A FILE 2
UNIT 2.79

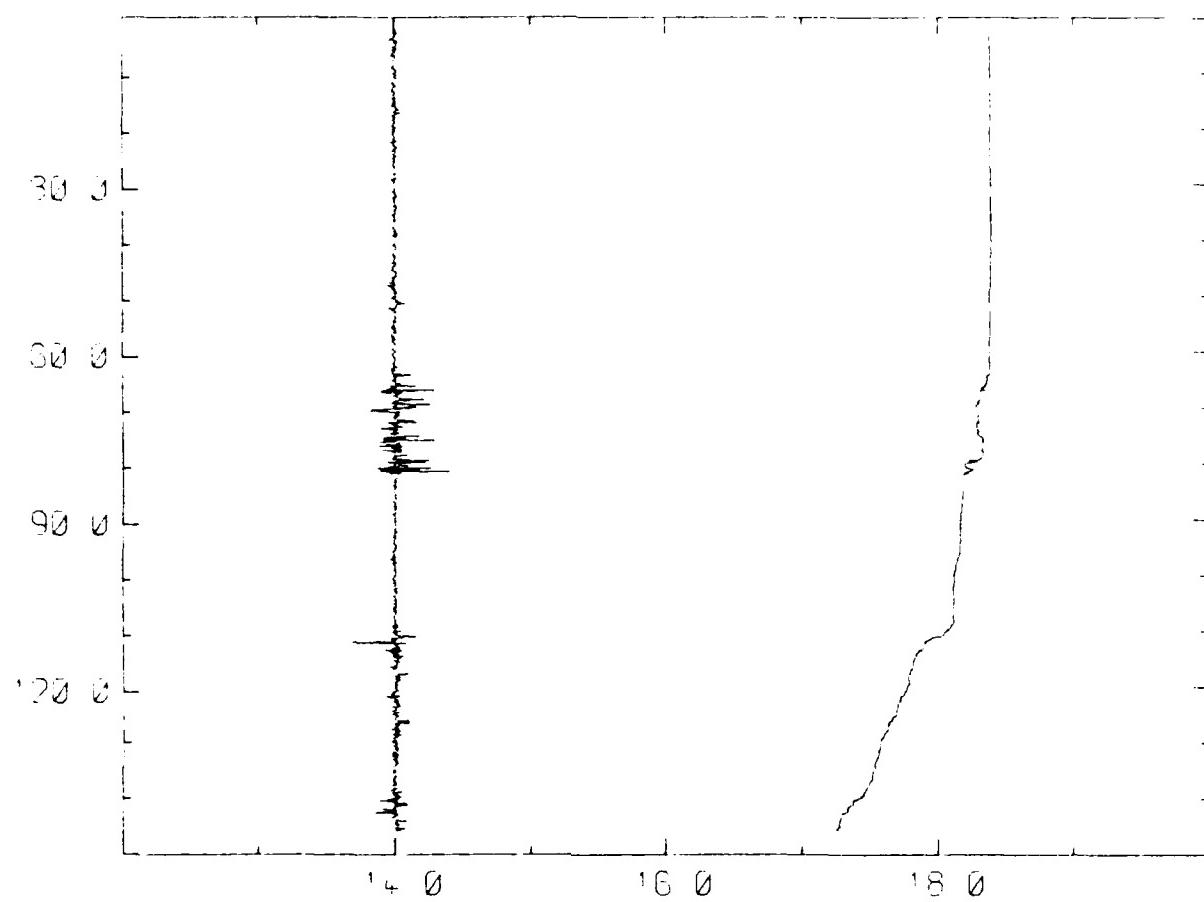


DATE 1/27/80
TIME 0239 GMT

TAPE FVB FILE 1
UNIT 2 79

89

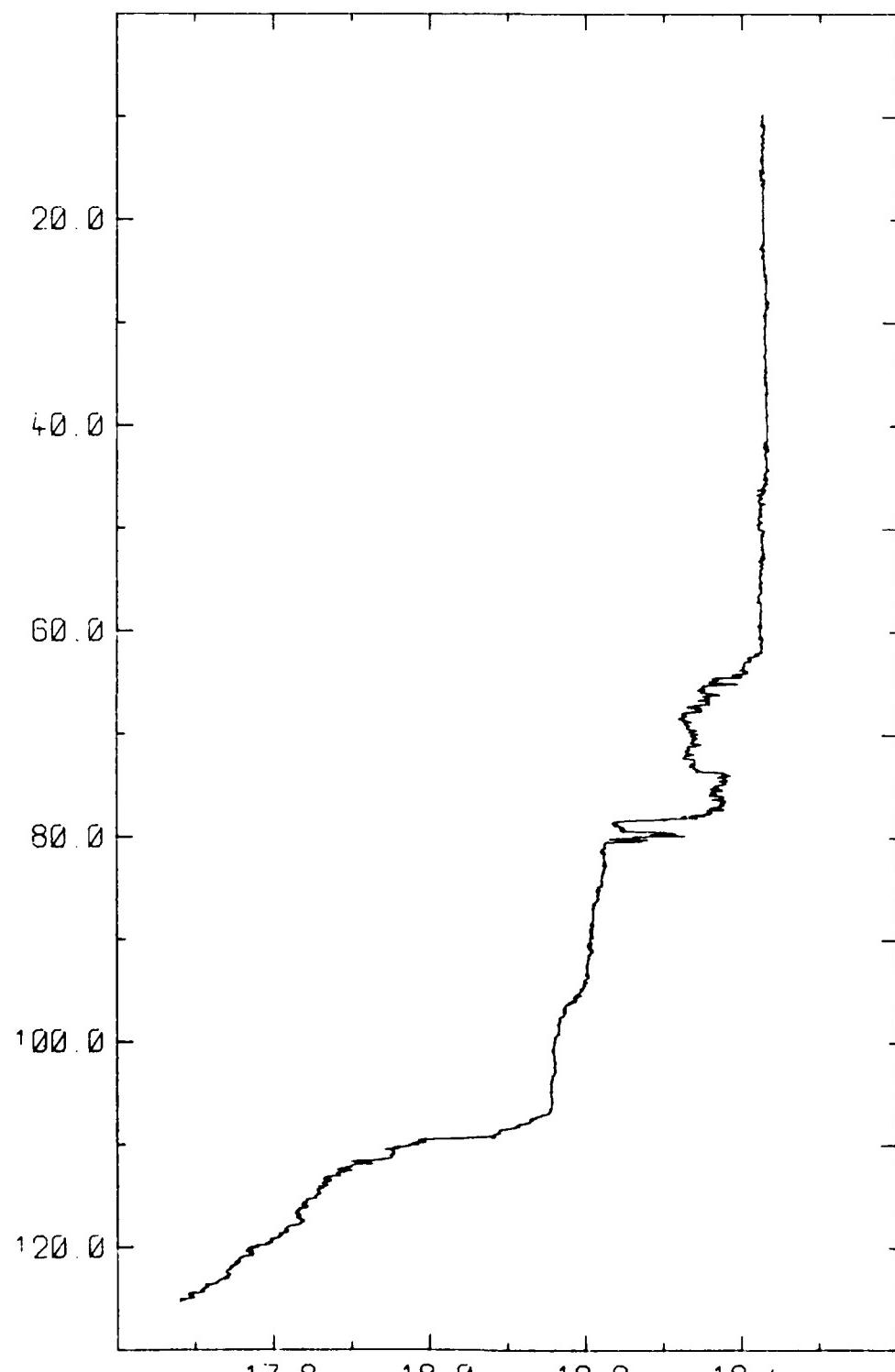
10 0 DEG/M



DATE 1/27/80
TIME 0403 GMT

90

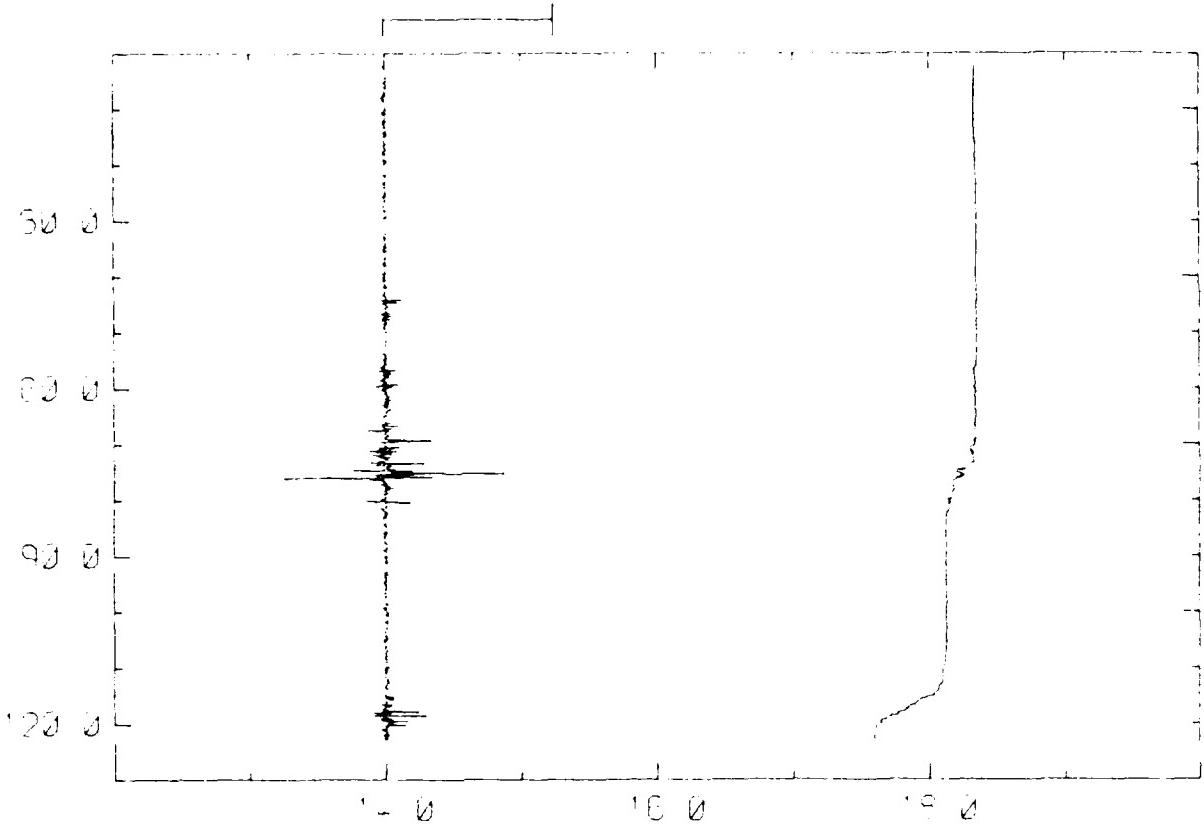
TAPE F7B FILE 1
UNIT 2.79



DATE 1/27/80
TIME 0403 GMT

TOPAZ 2 FILE 2
UNIT P 79

10 DEG/M

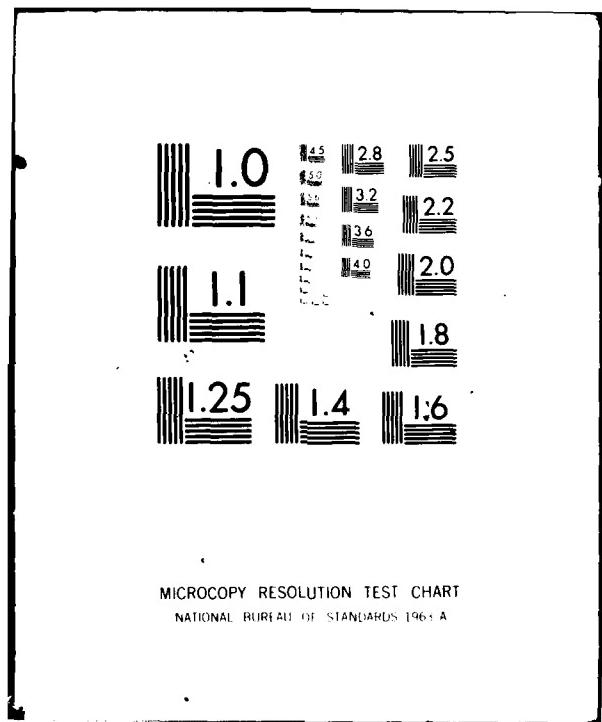


DATE 1/27/80
TIME 0-55 GMT

AD-A092 650 OREGON STATE UNIV CORVALLIS SCHOOL OF OCEANOGRAPHY F/6 8/10
TEMPERATURE MICROSTRUCTURE PROFILES FROM THE SUB-TROPICAL FRONT--ETC(U)
SEP 80 T M DILLON, D R CALDWELL N00014-79-C-0004
UNCLASSIFIED DATA-84 NL

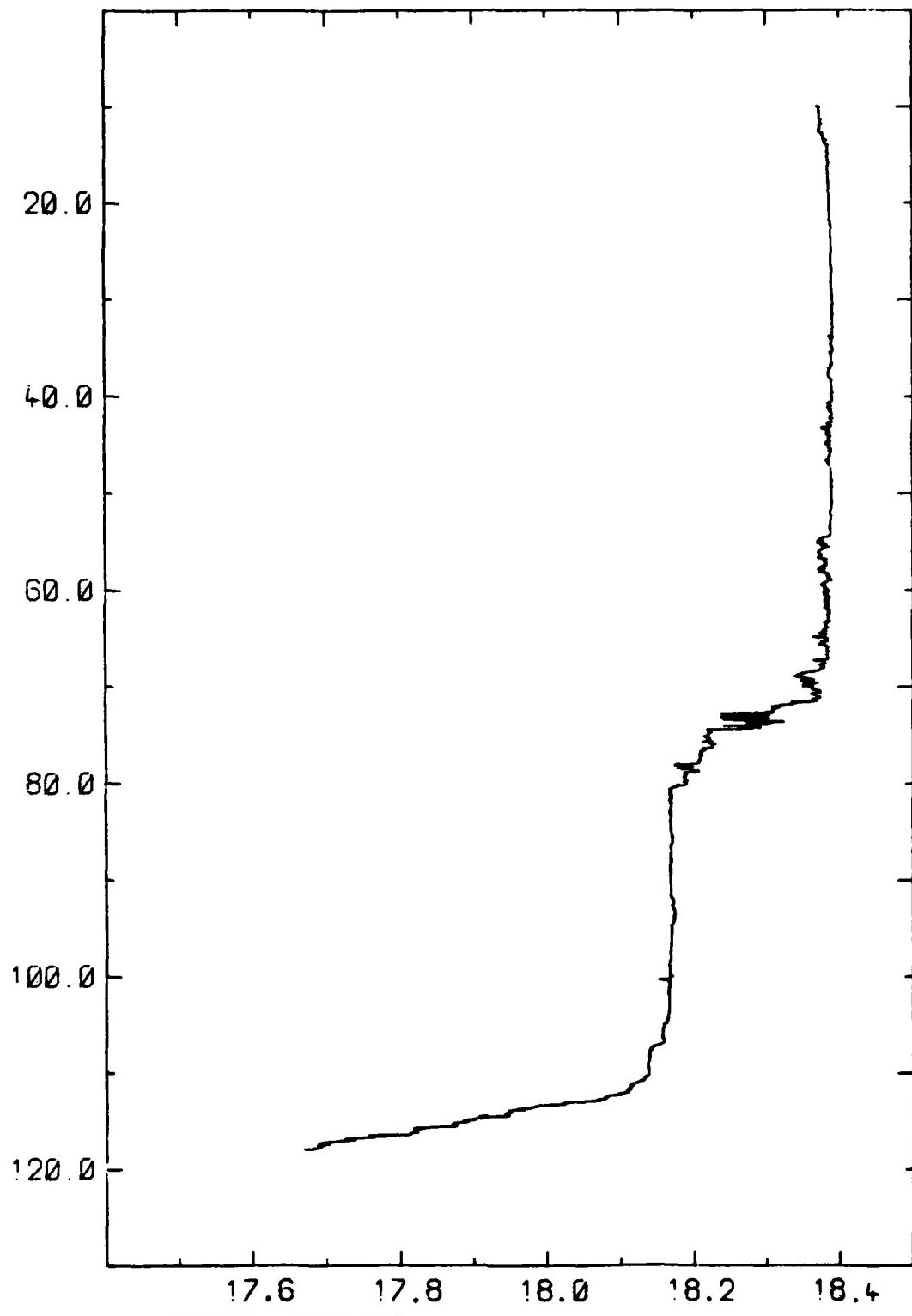
FIG 2
A. D. Dillon

END
DATE FILMED
10/80
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92

TAPE F7B FILE 2
UNIT 2.79

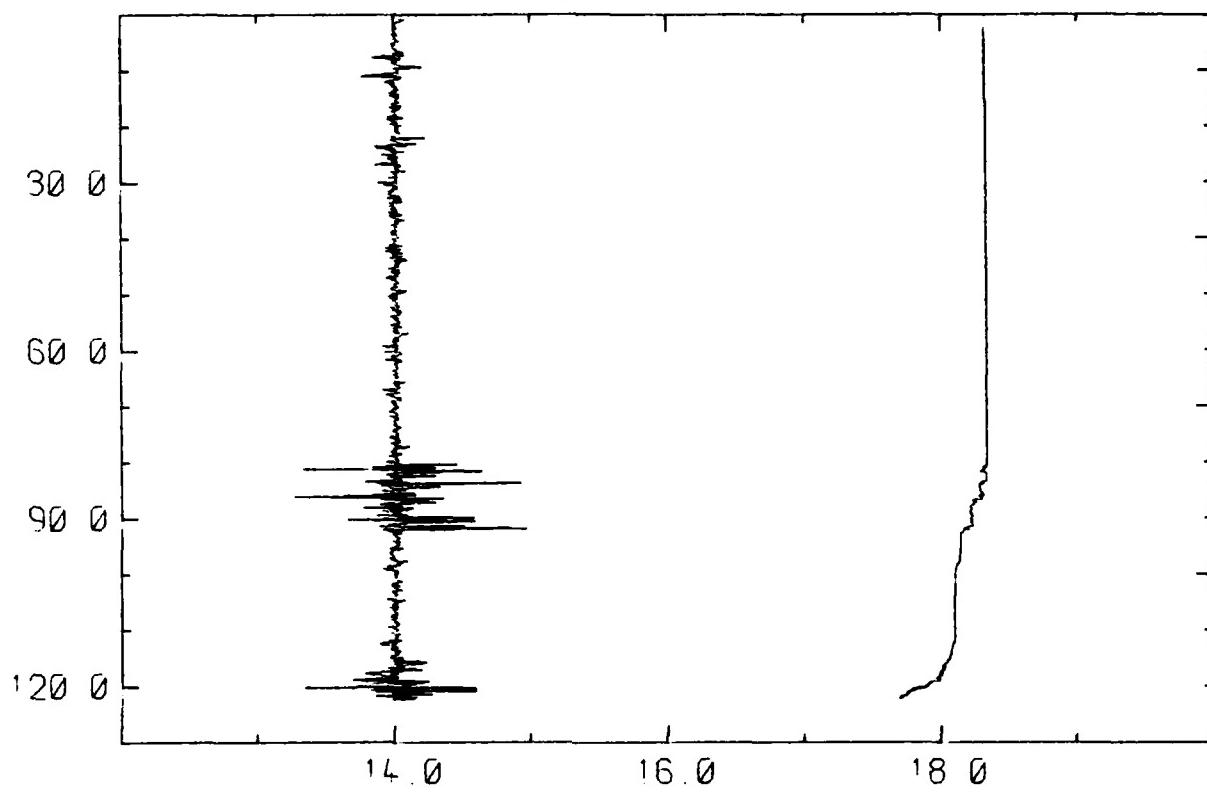


DATE 1/27/80
TIME 0455 GMT

TAPE F7C FILE 1
UNIT 2.79

93

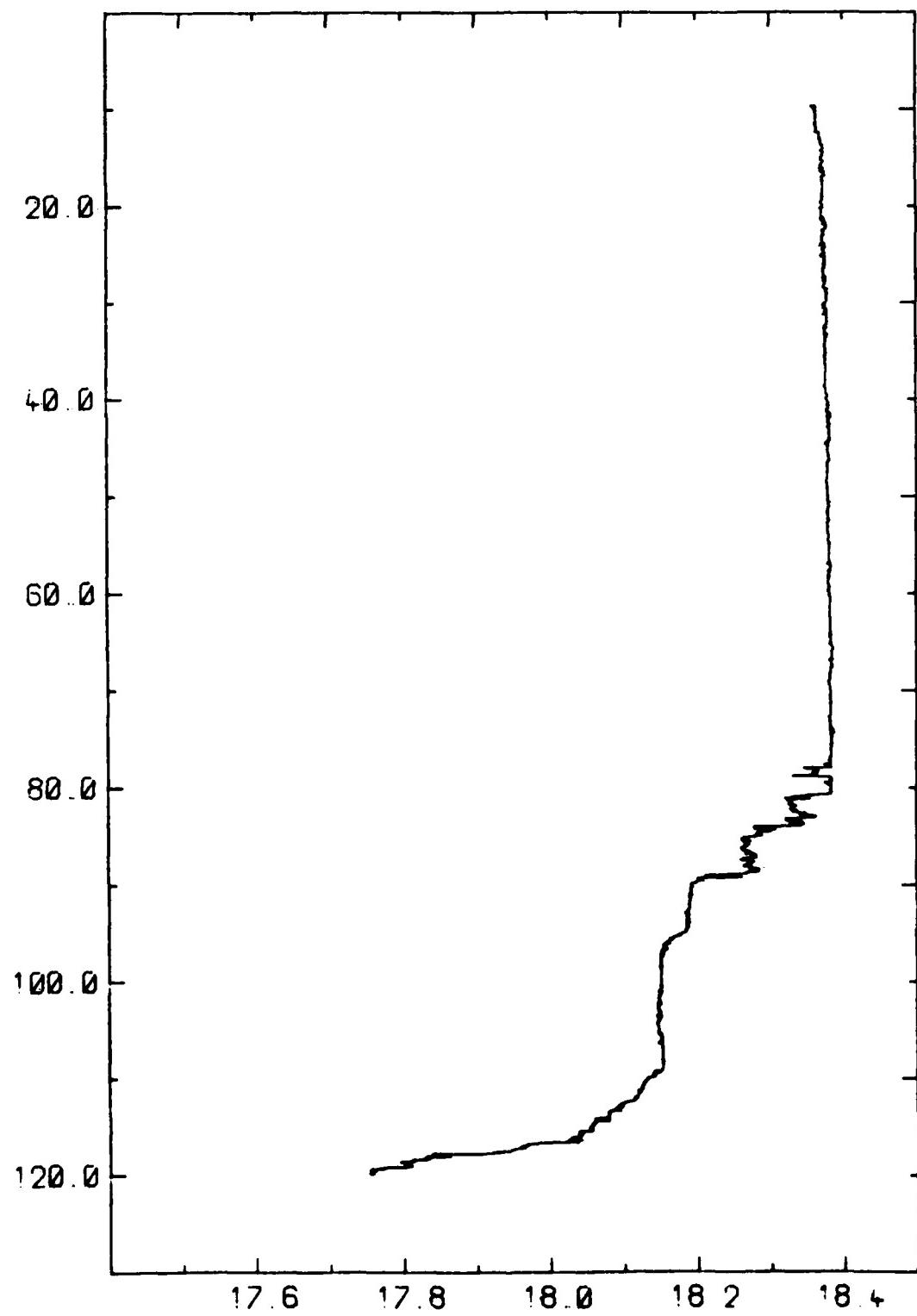
3.0 DEG/M



DATE 1/27/80
TIME 0529 GMT

94

TAPE F7C FILE 1
UNIT 2.79

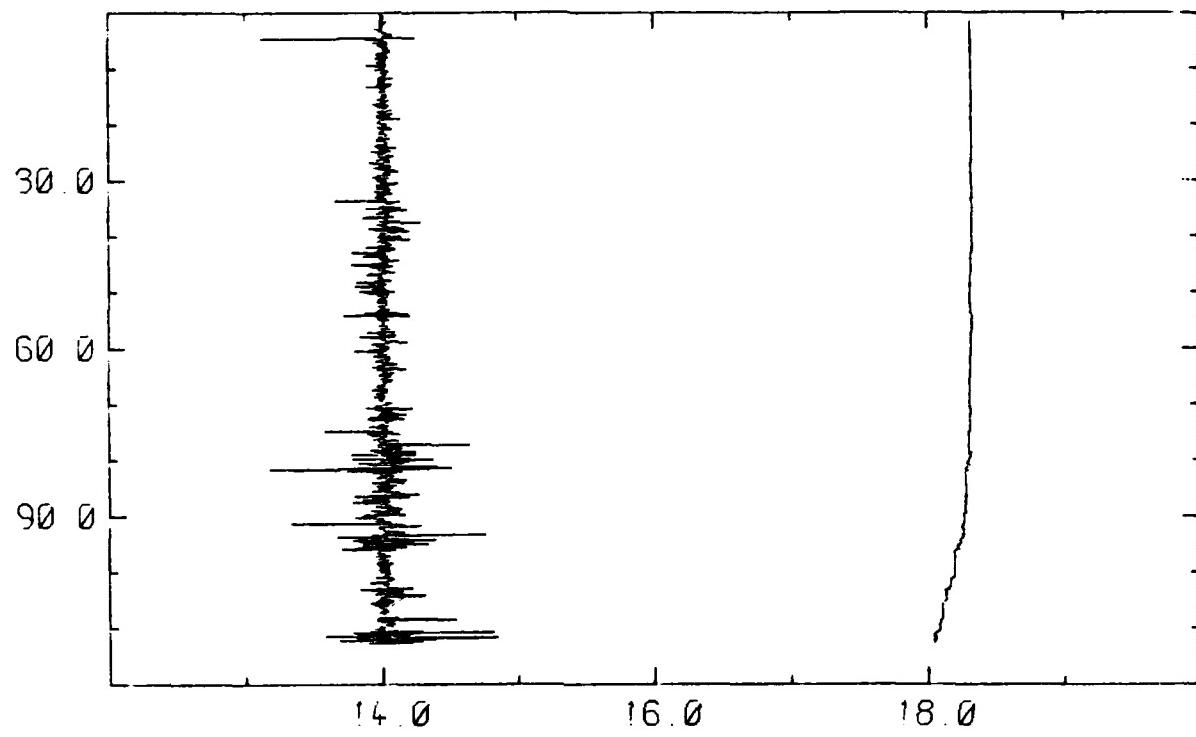


DATE 1/27/80
TIME 0429 GMT

TAPE F7C FILE 2
UNIT 2.79

95

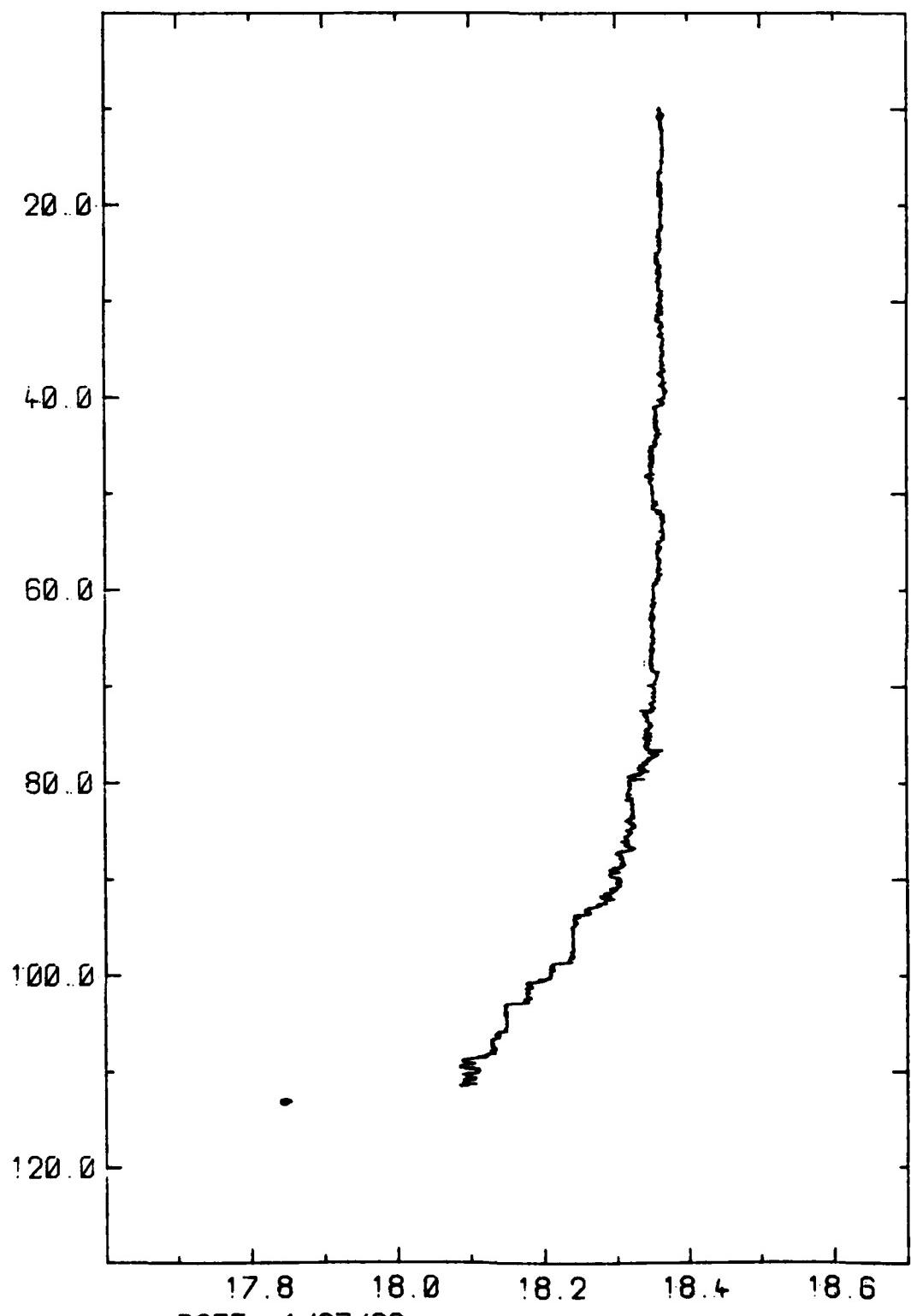
3.0 DEG/M



DATE 1/27/80
TIME 0549 GMT

96

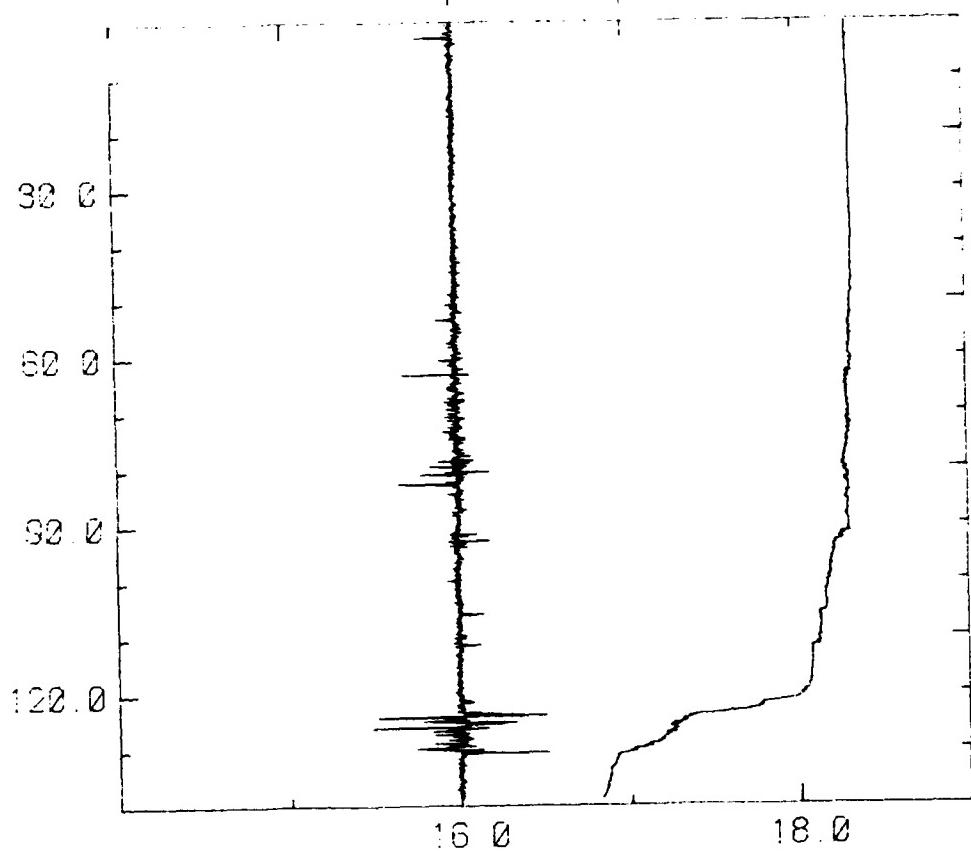
TAPE F7C FILE 2
UNIT 2.79



DATE 1/27/80
TIME 0449 GMT

TAPE F7C FILE 5
UNIT 2.79

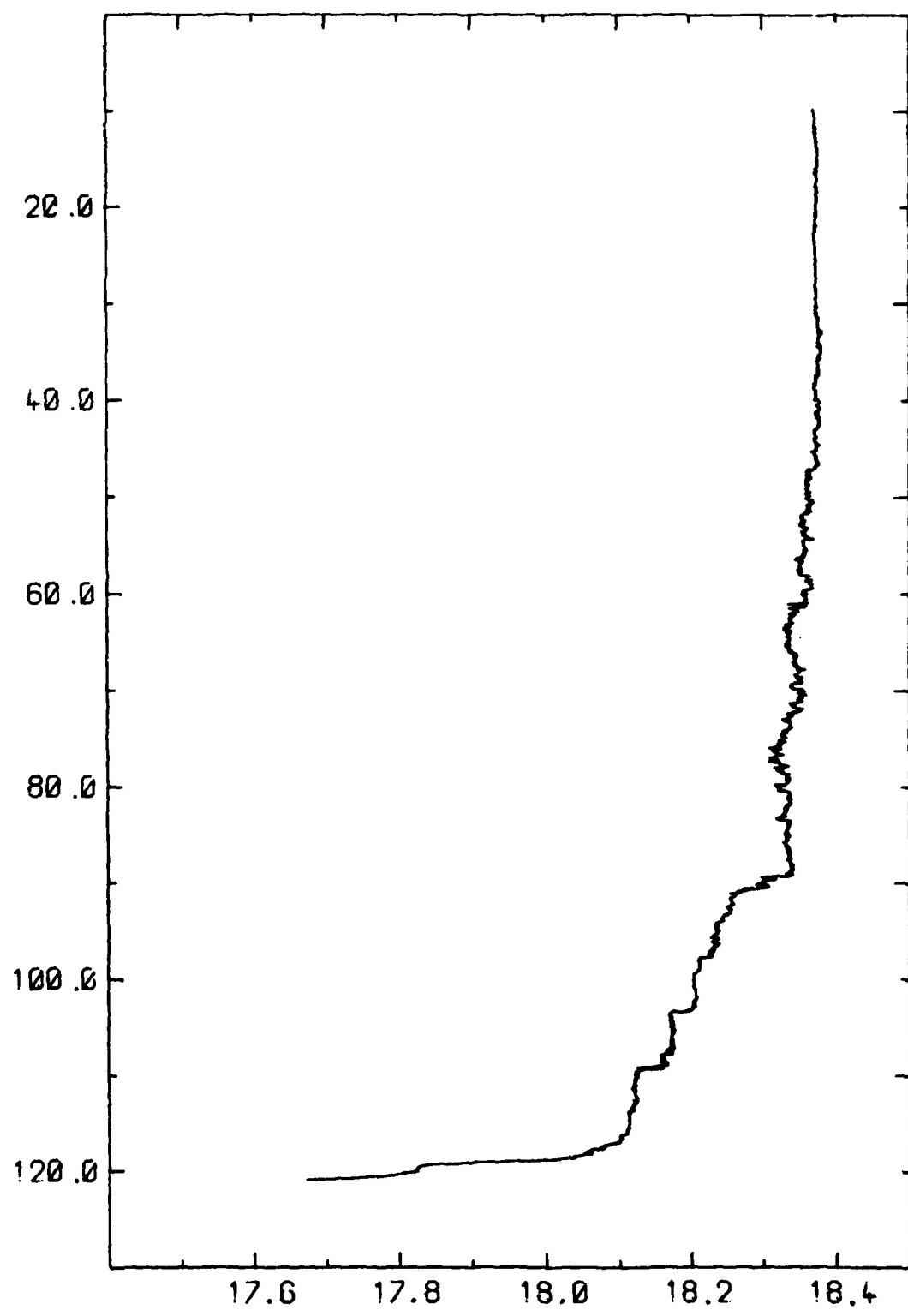
10.0 DEG/M



DATE 1/27/80
TIME 0616 GMT

98

TAPE F7C FILE 5
UNIT 2.79

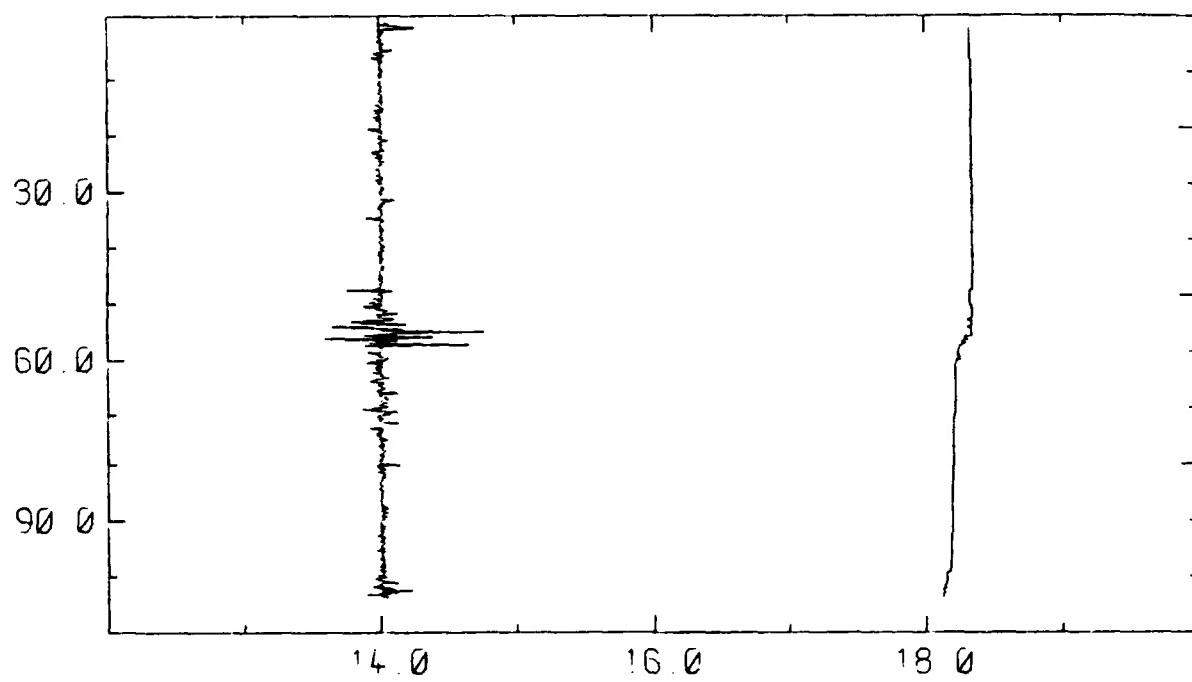


DATE 1/27/80
TIME 0616 GMT

TAPE F7D FILE 1
UNIT 7 79

99

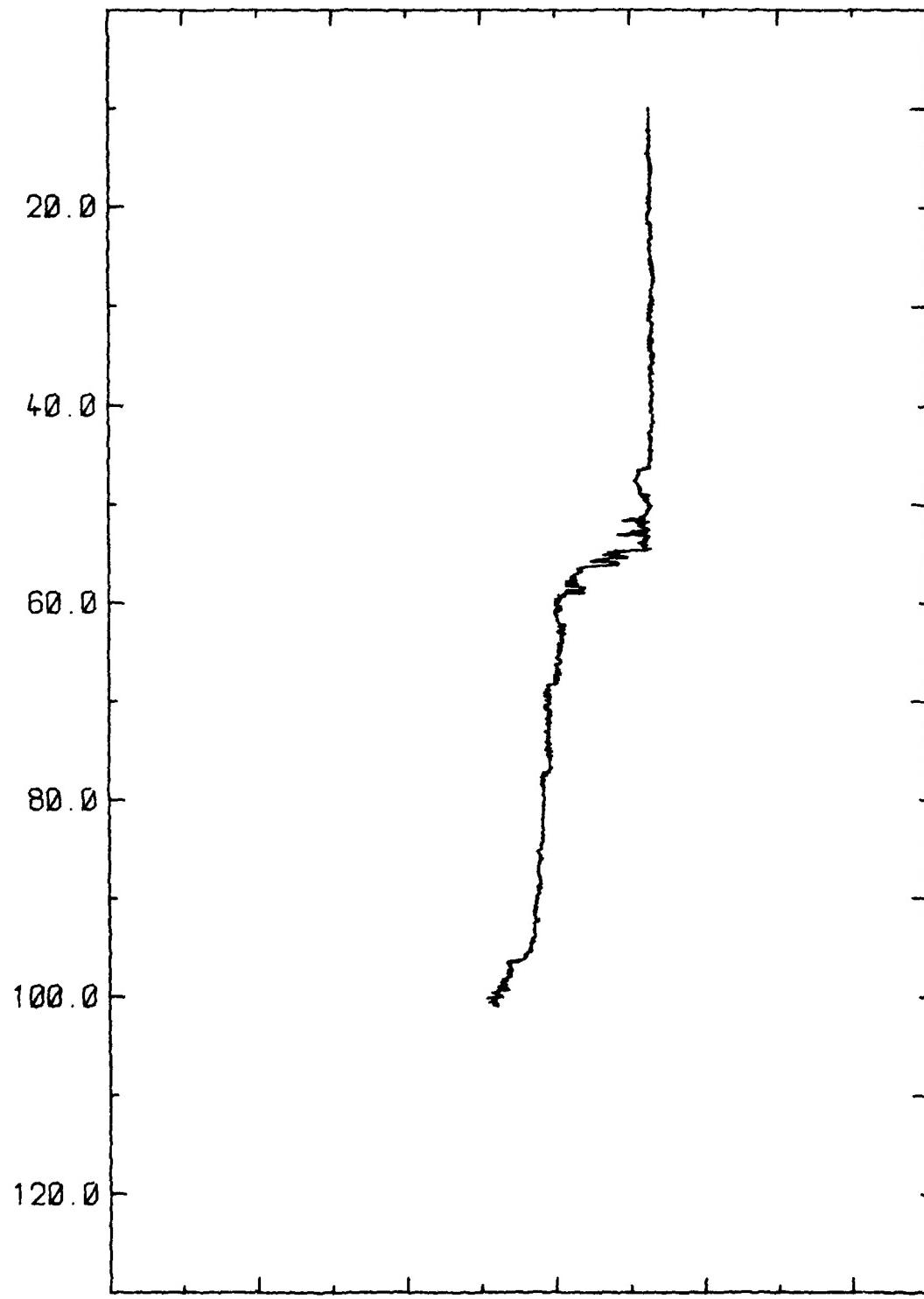
3.0 DEG/M



DATE 1/27/80
TIME 0743 GMT

100

TAPE F70 FILE 1
UNIT 7.79



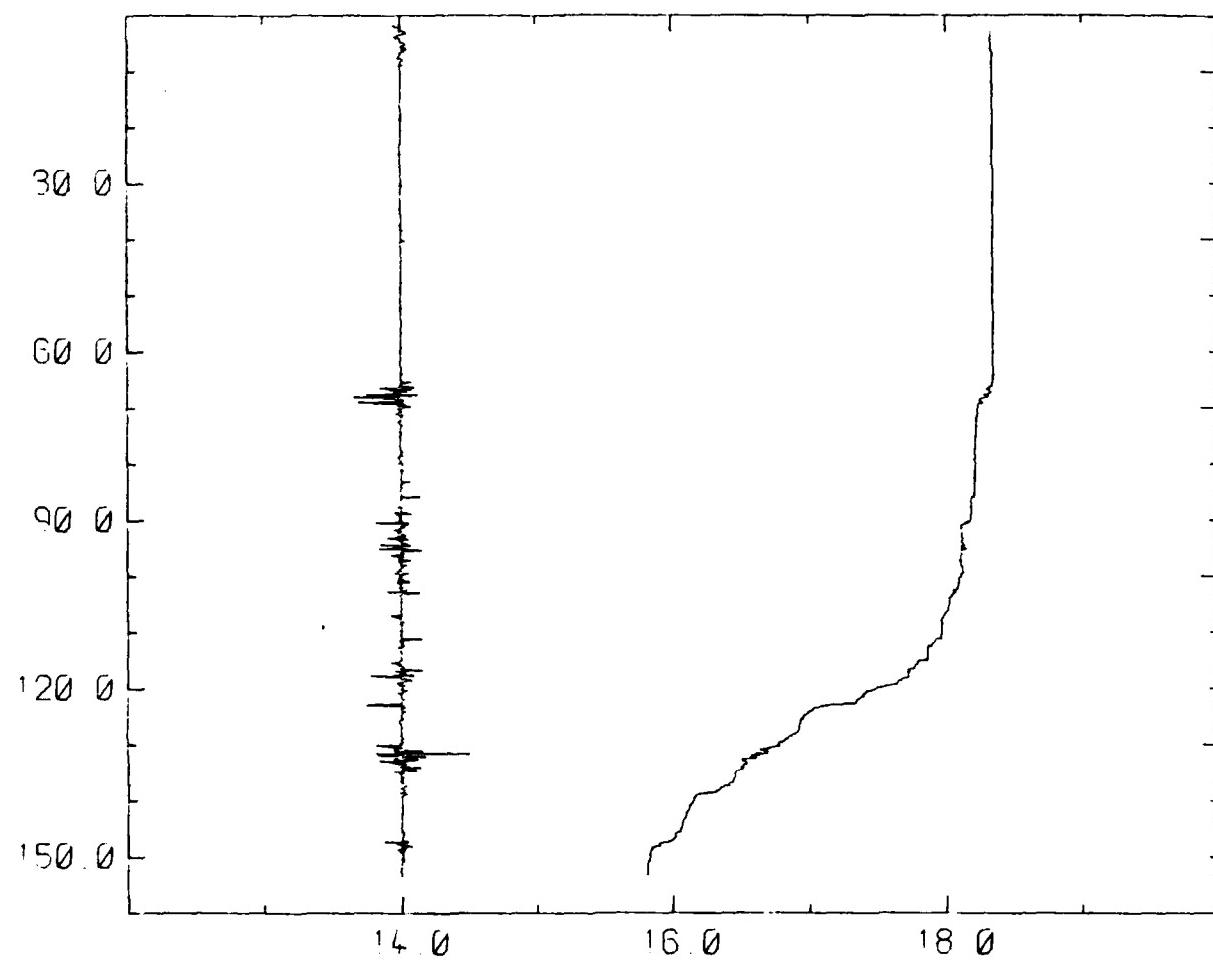
DATE 1/27/80

TIME 0743 GMT

TAPE F7D FILE 2
UNIT 7.79

101

10.0 DEG/M

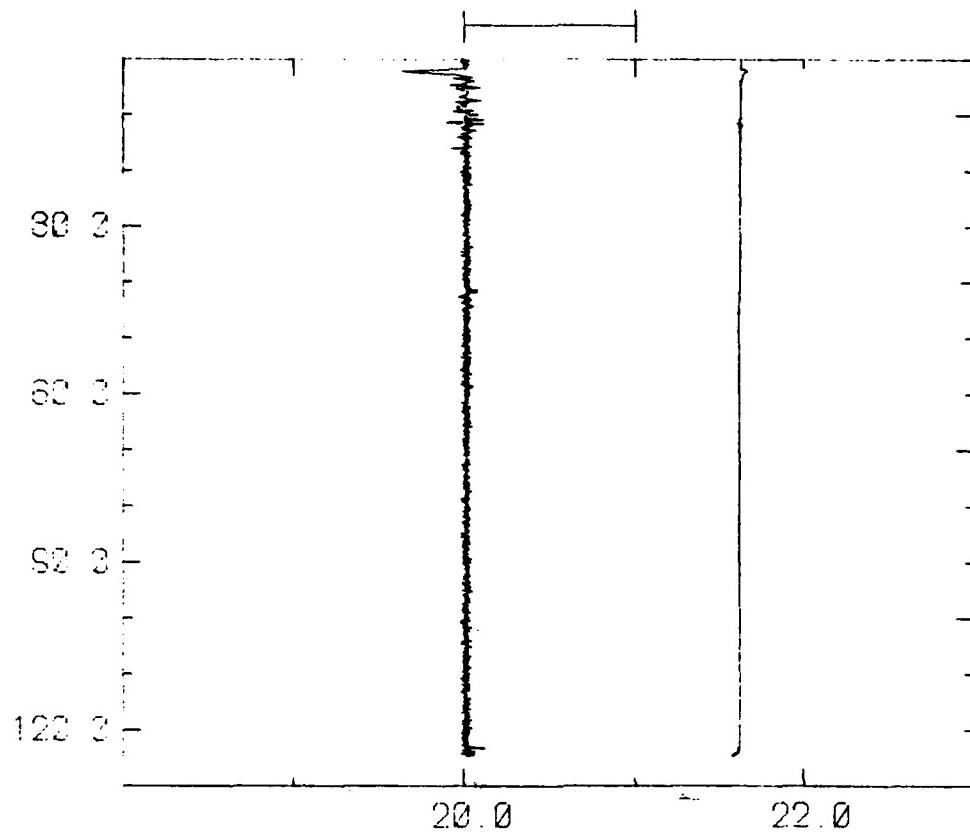


DATE 1/27/80
TIME 0758 GMT

102

TAPE F8A FILE 5
UNIT 7.79

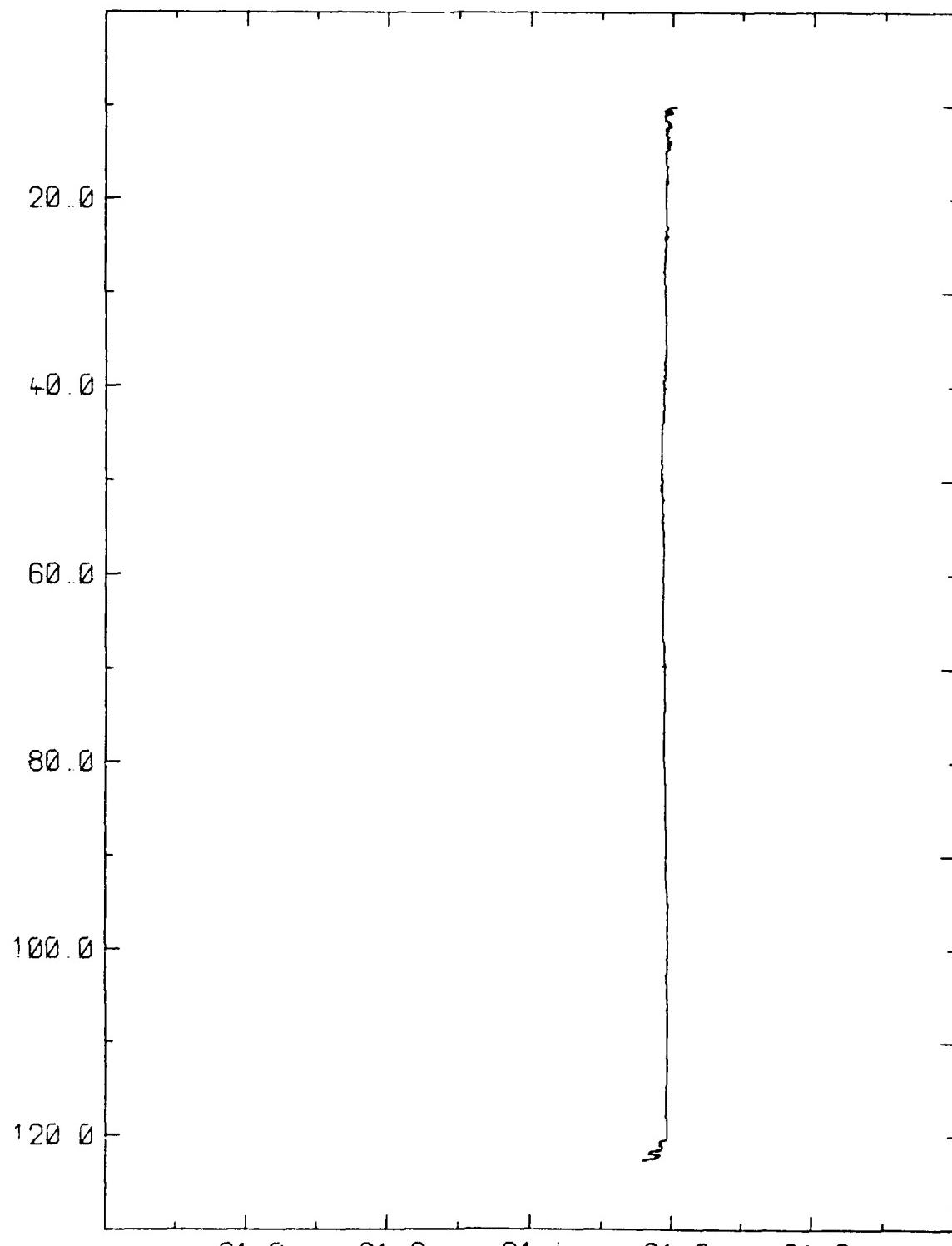
3.0 DEG/M



DATE 1/28/80
TIME 2118 GMT

TAPE F8A FILE 5
UNIT 7.79

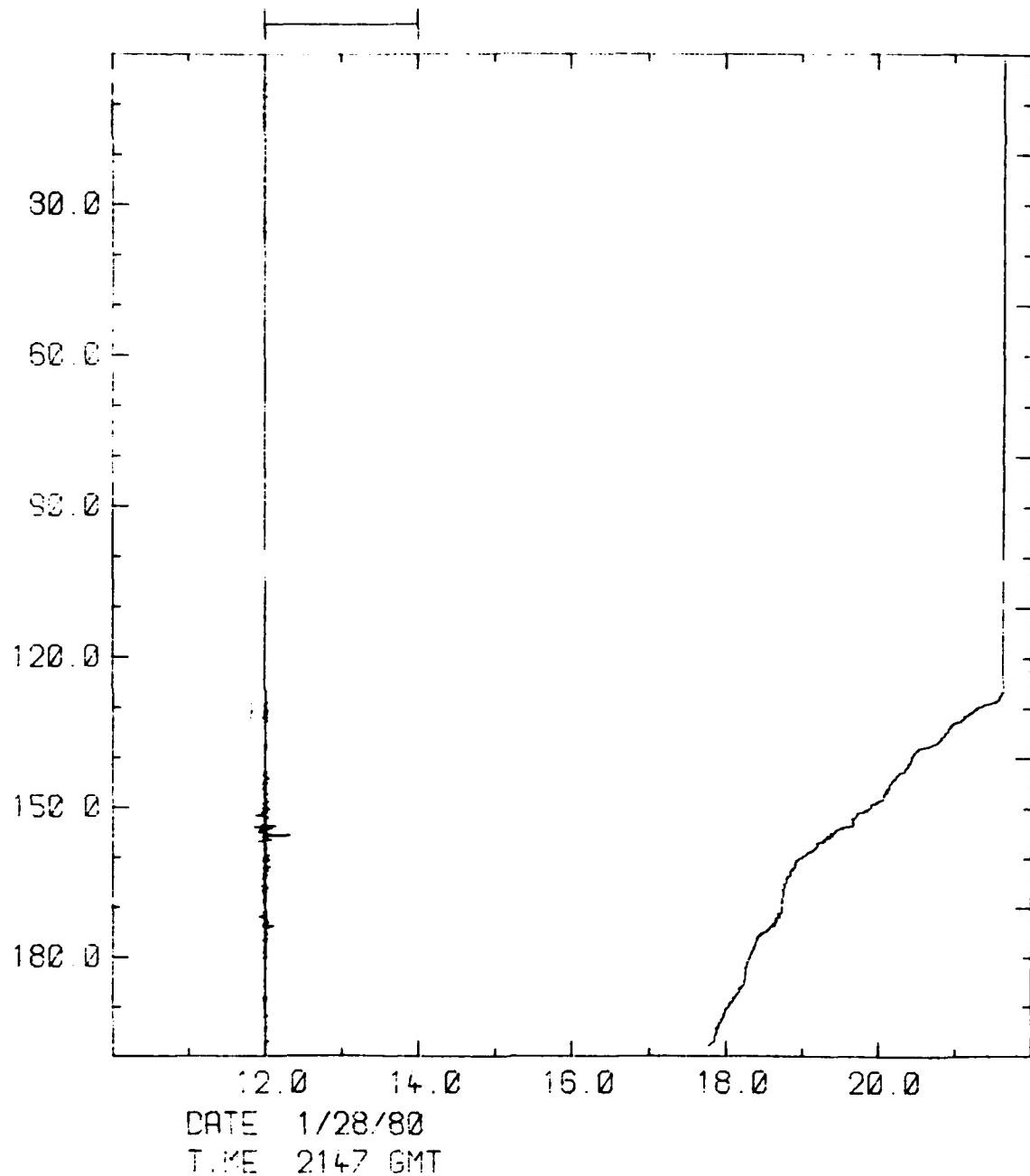
103



DATE 1/28/80
TIME 2118 GMT

104

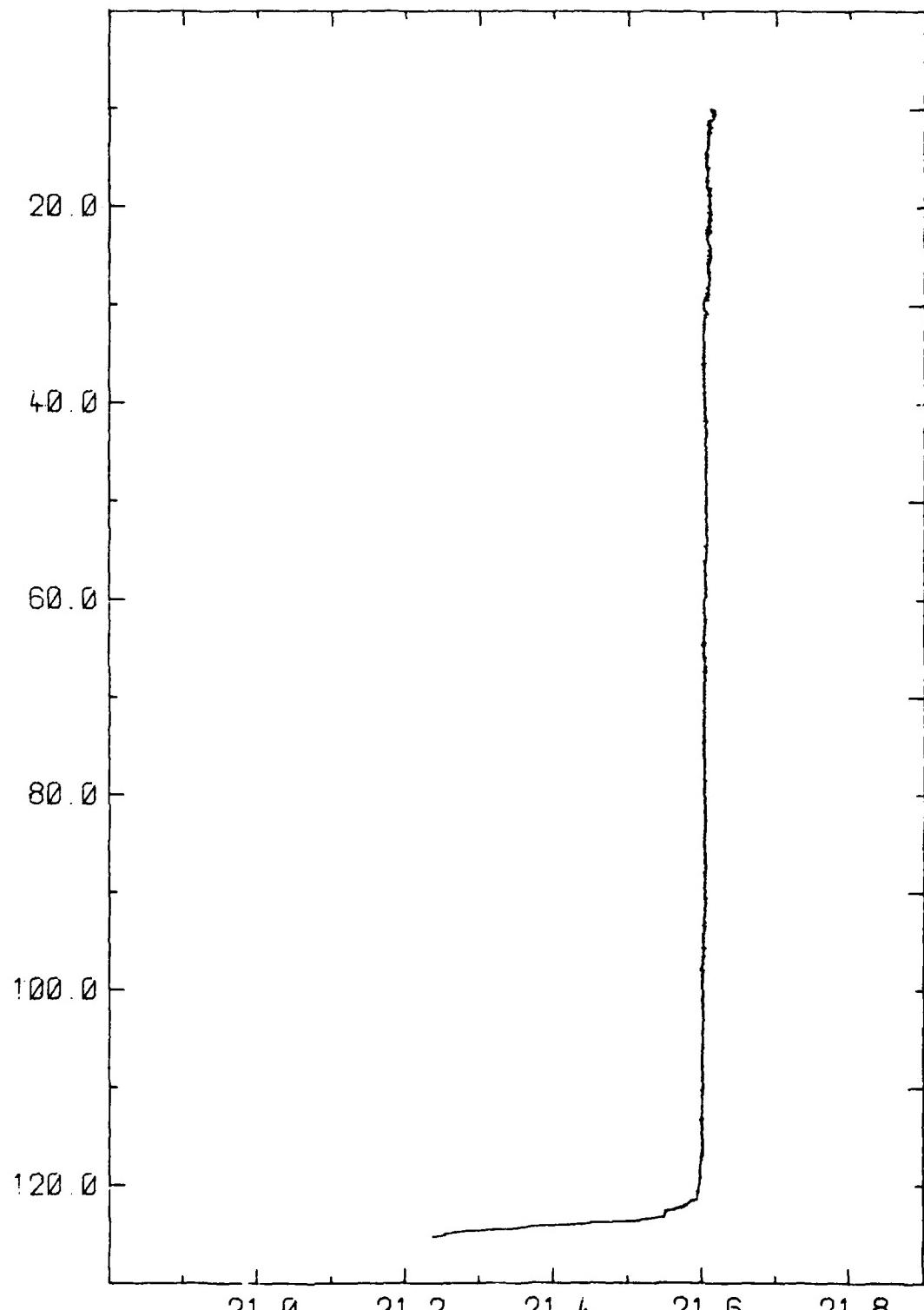
TAPE F8A FILE 6
UNIT 7.79
30.0 DEG/M



DATE 1/28/80
TIME 2147 GMT

TAPE F8A FILE 6
UNIT 7.79

105

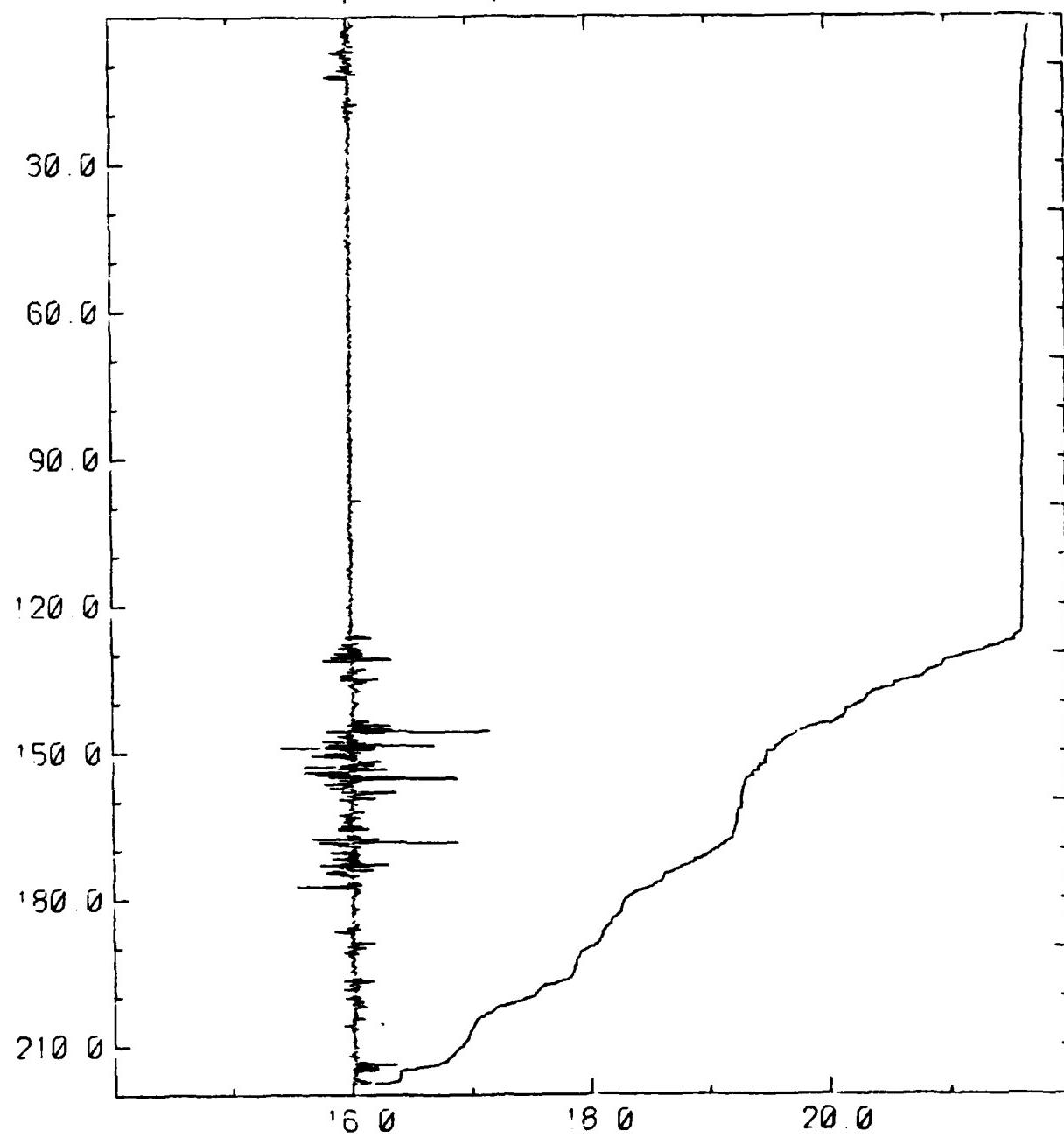


DATE 1/28/80
TIME 2147 GMT

106

TAPE F8B FILE 1
UNIT 7.79

3.0 DEG/M

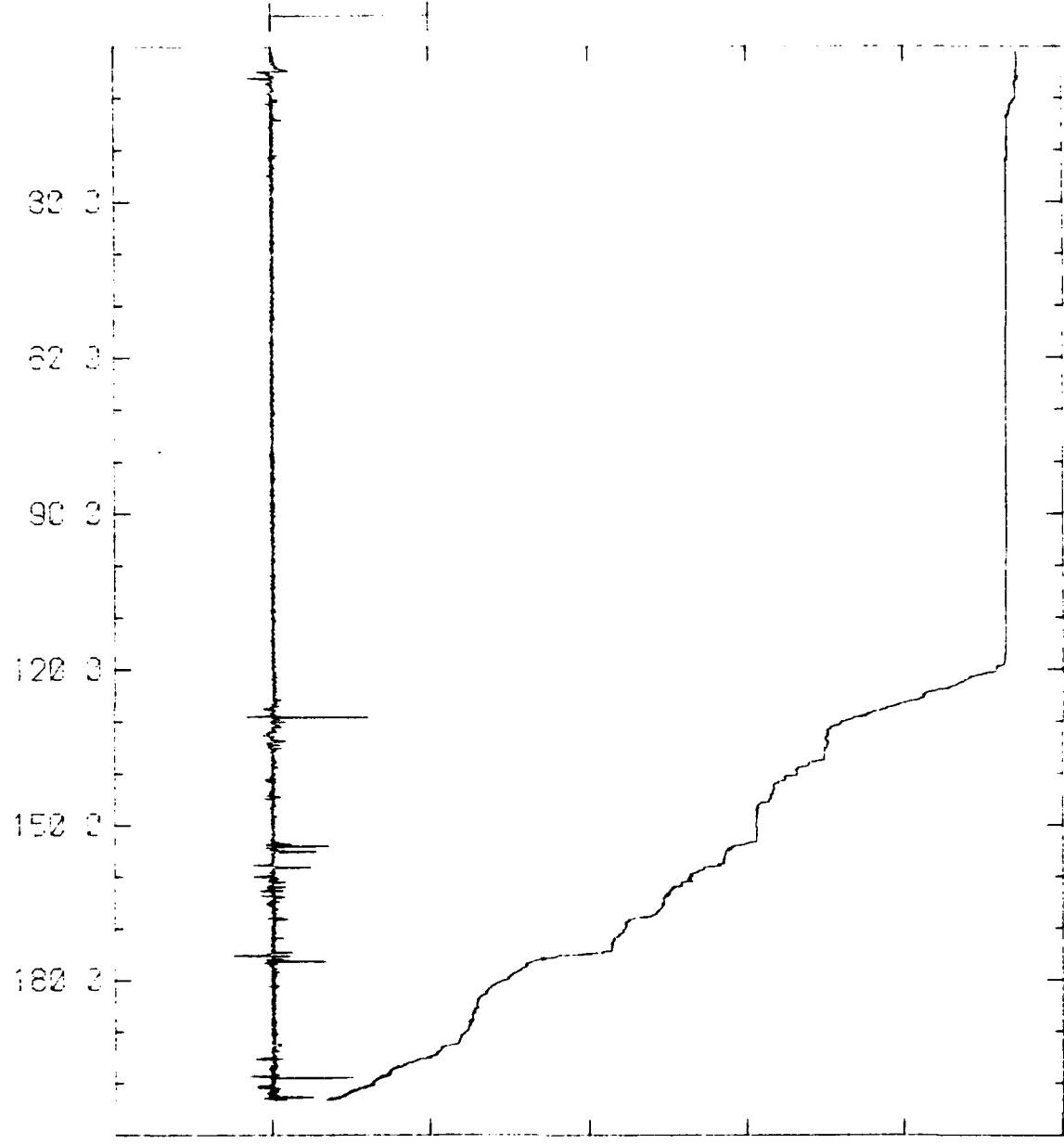


DATE 1/28/80
TIME 2236 GMT

TAPE F8B FILE 2
UNIT 7.79

107

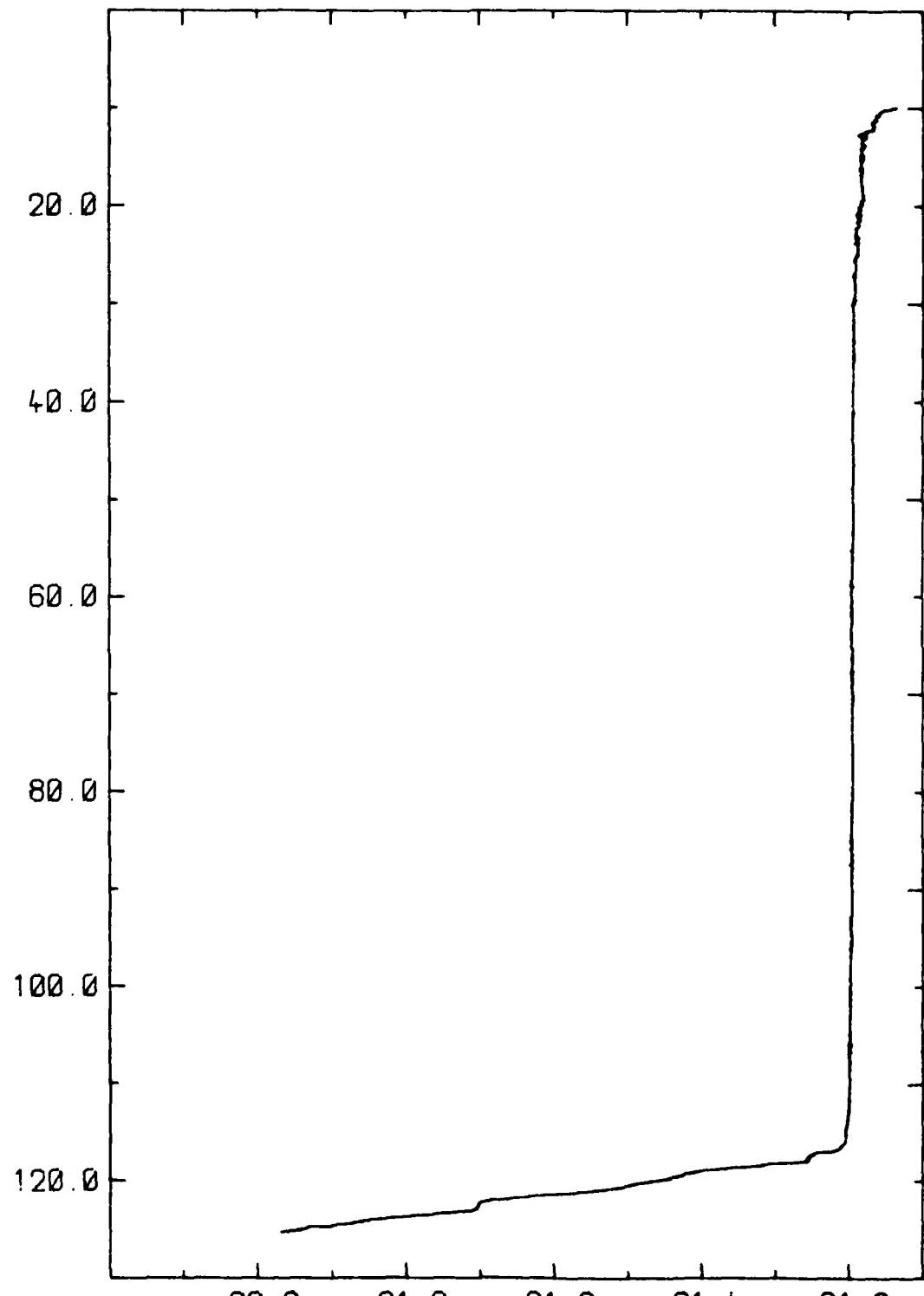
10.0 DEG. M



DATE 1/28/80
TIME 2312 GMT

108

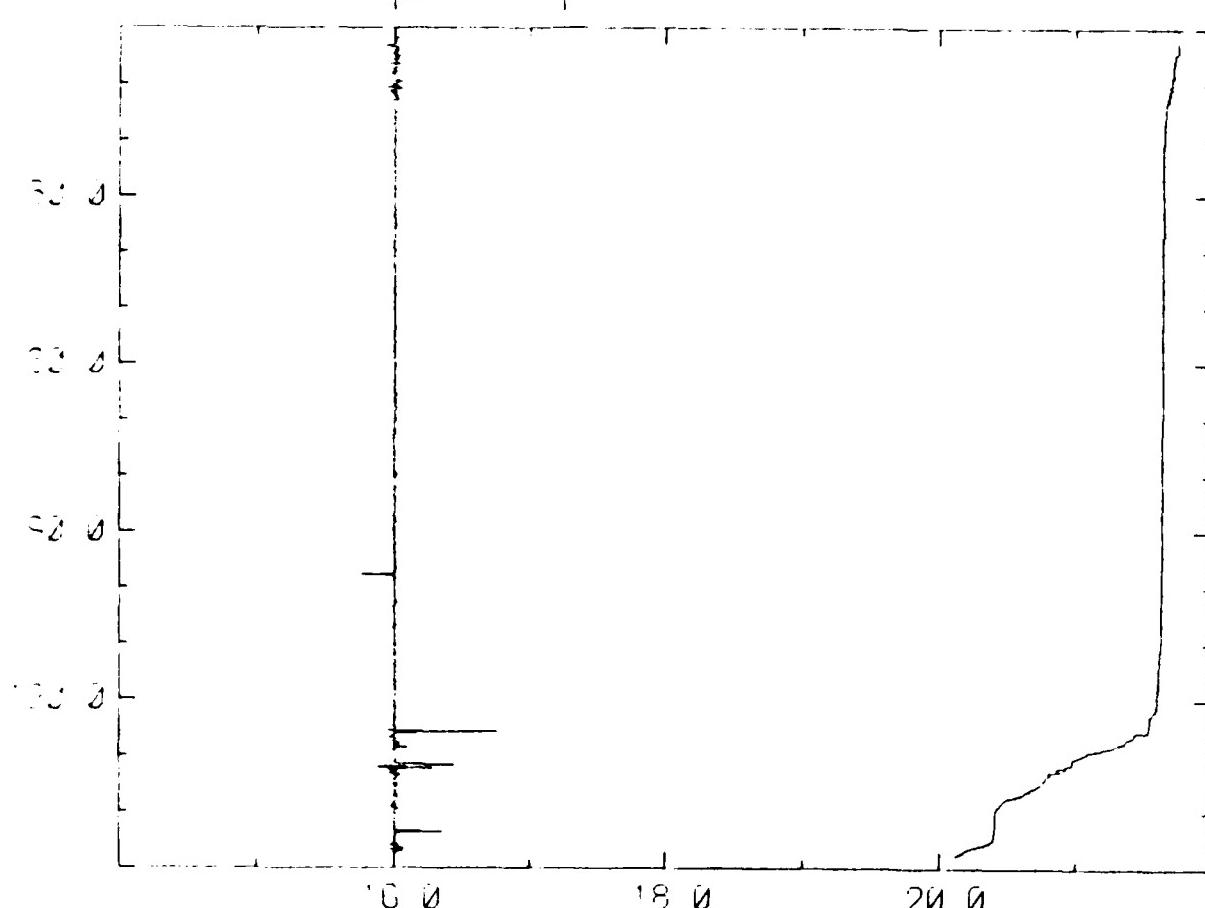
TAPE F8B FILE 2
UNIT 7.79



DATE 1/28/80
TIME 2312 GMT

TAPE F8C FILE 1
UNIT 779

'0 0 DEG/M

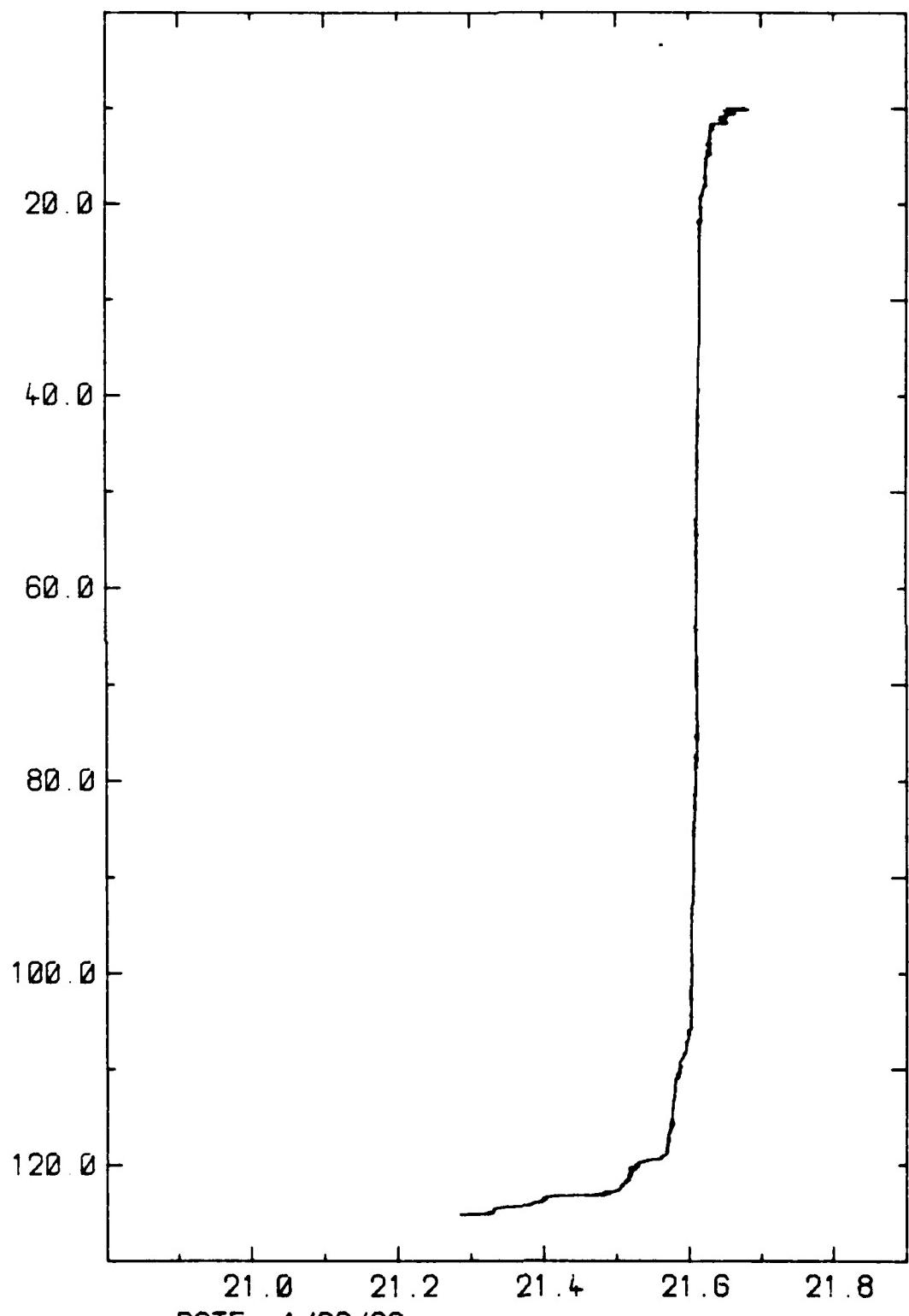


DATE 1/28/80

TIME 2346 GMT

110

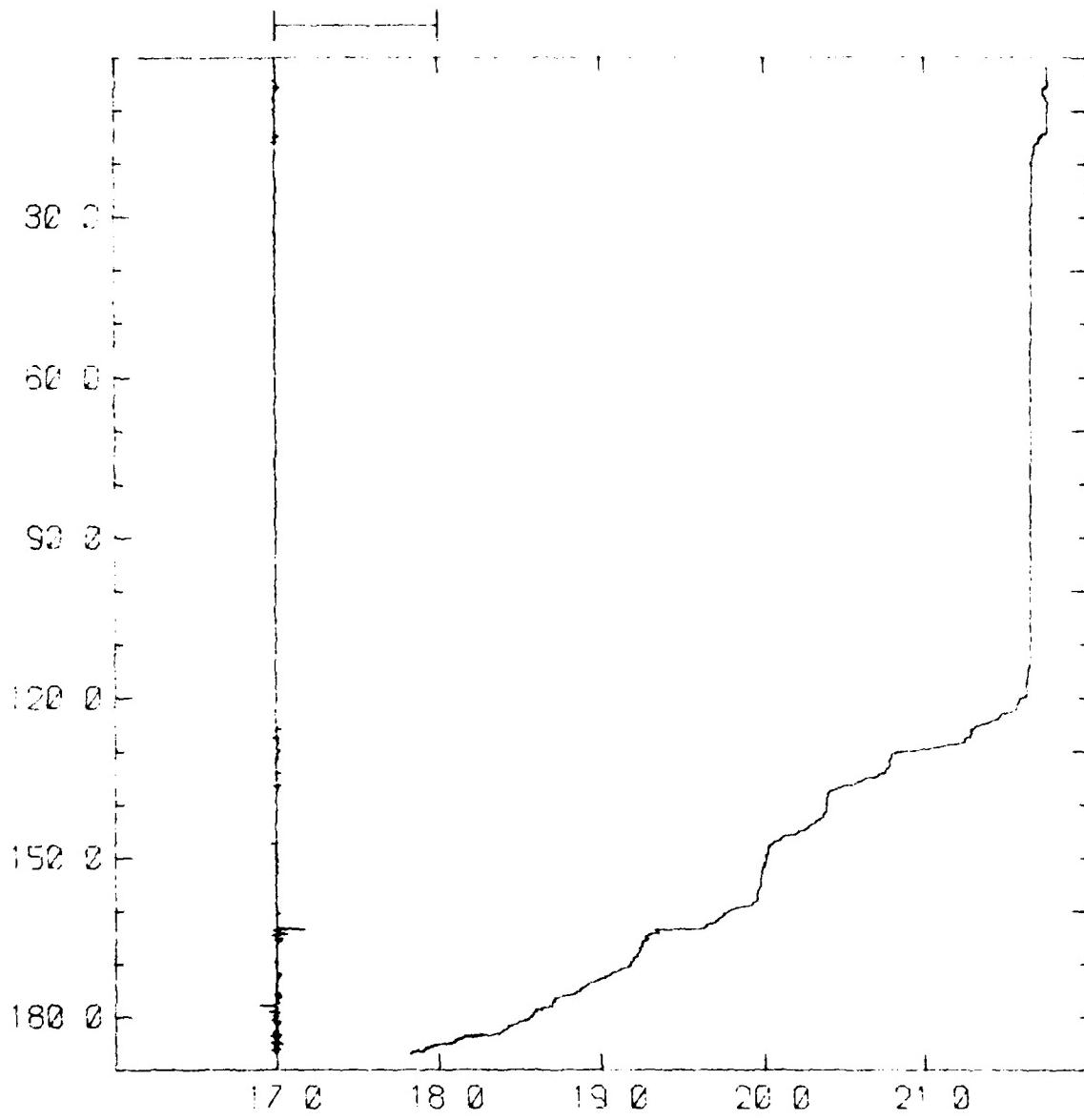
TAPE F8C FILE 1
UNIT 7.79



DATE 1/28/80
TIME 2346 GMT

TAPE F8C FILE 2
UNIT 7 79
30.0 DEG/M

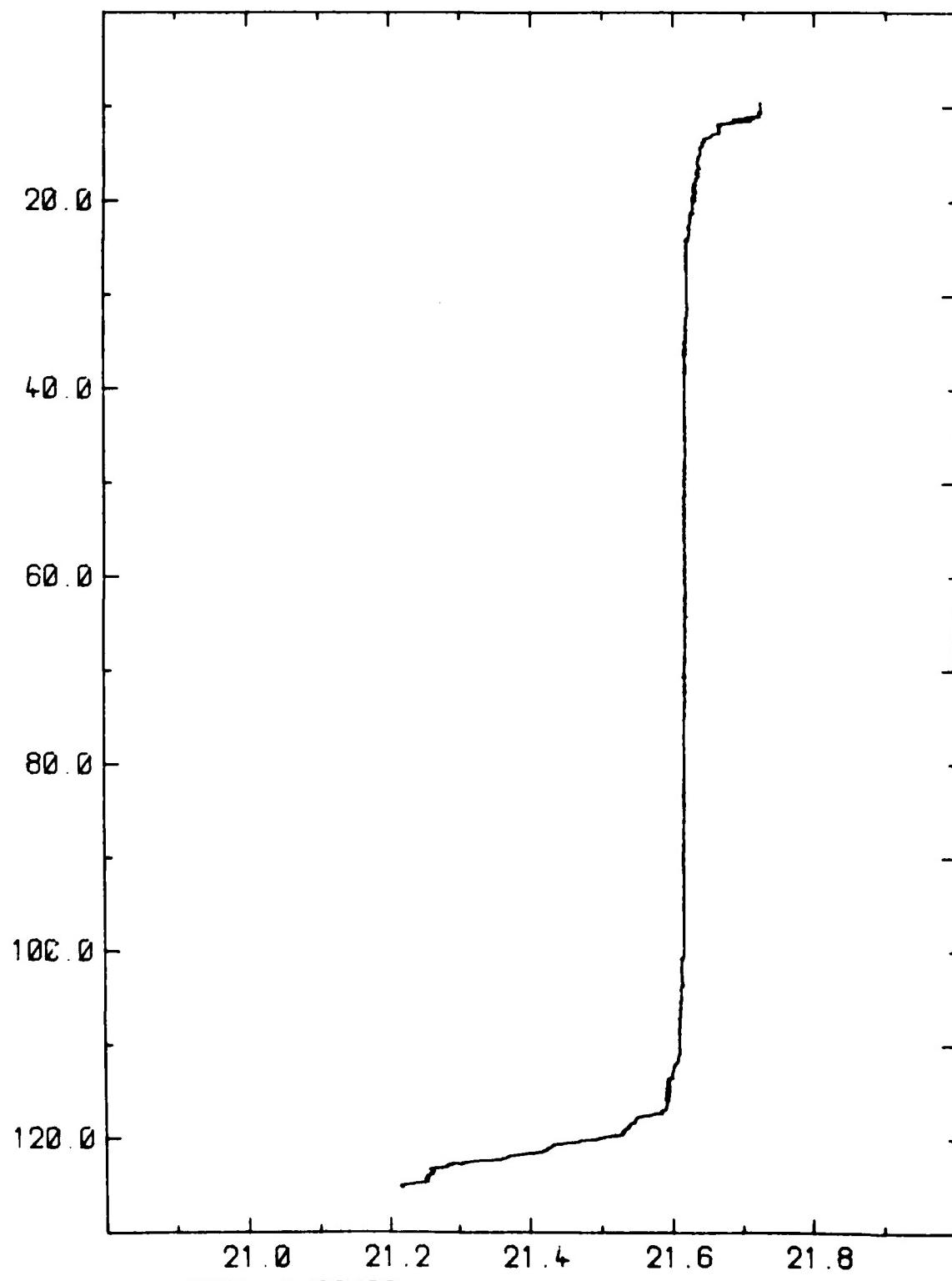
111



DATE 1/28/80
TIME 0019 GMT

112

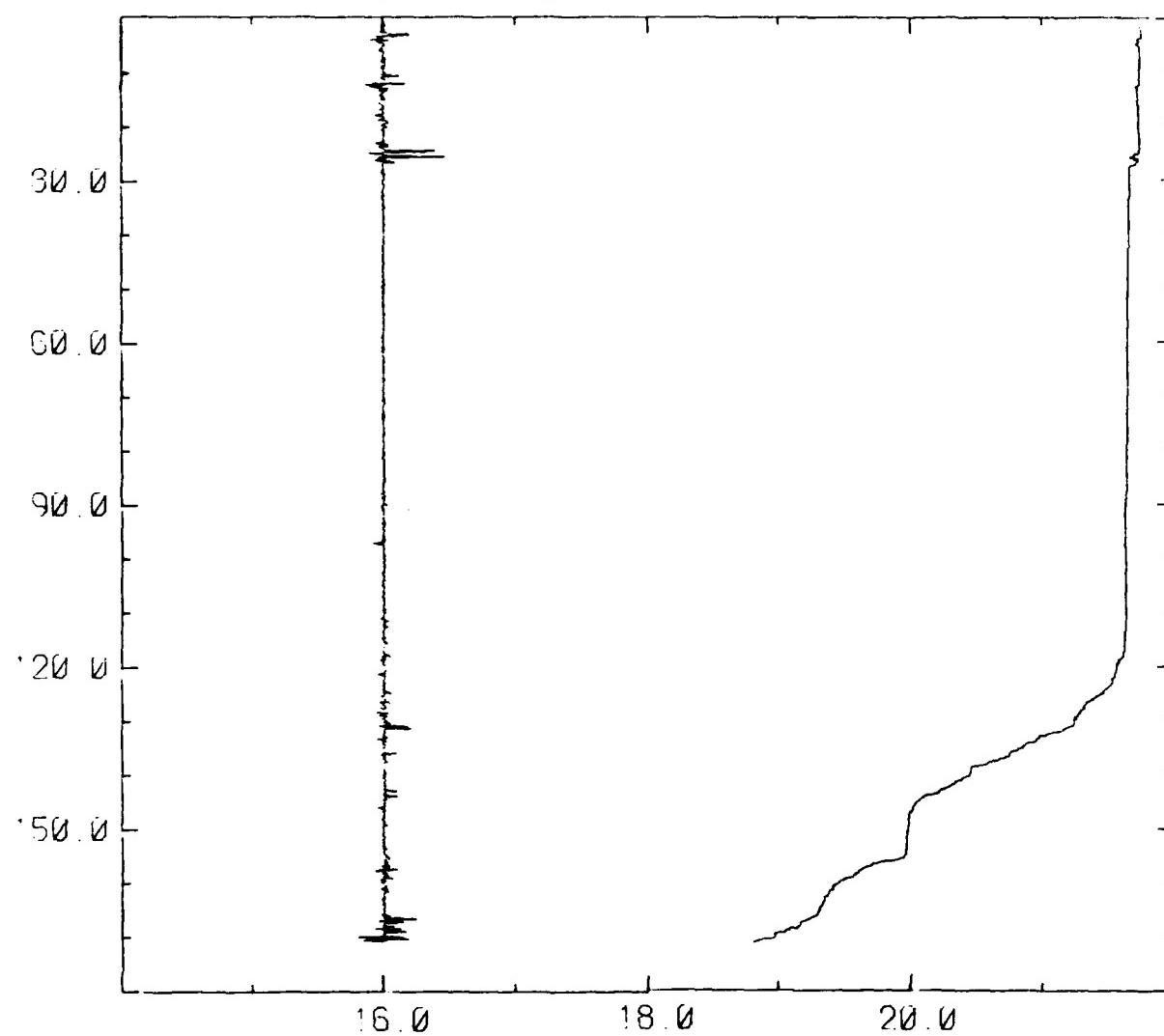
TAPE F8C FILE 2
UNIT 7.79



DATE 1/29/80
TIME 0019 GMT

TAPE F8D FILE 1
UNIT 7.79

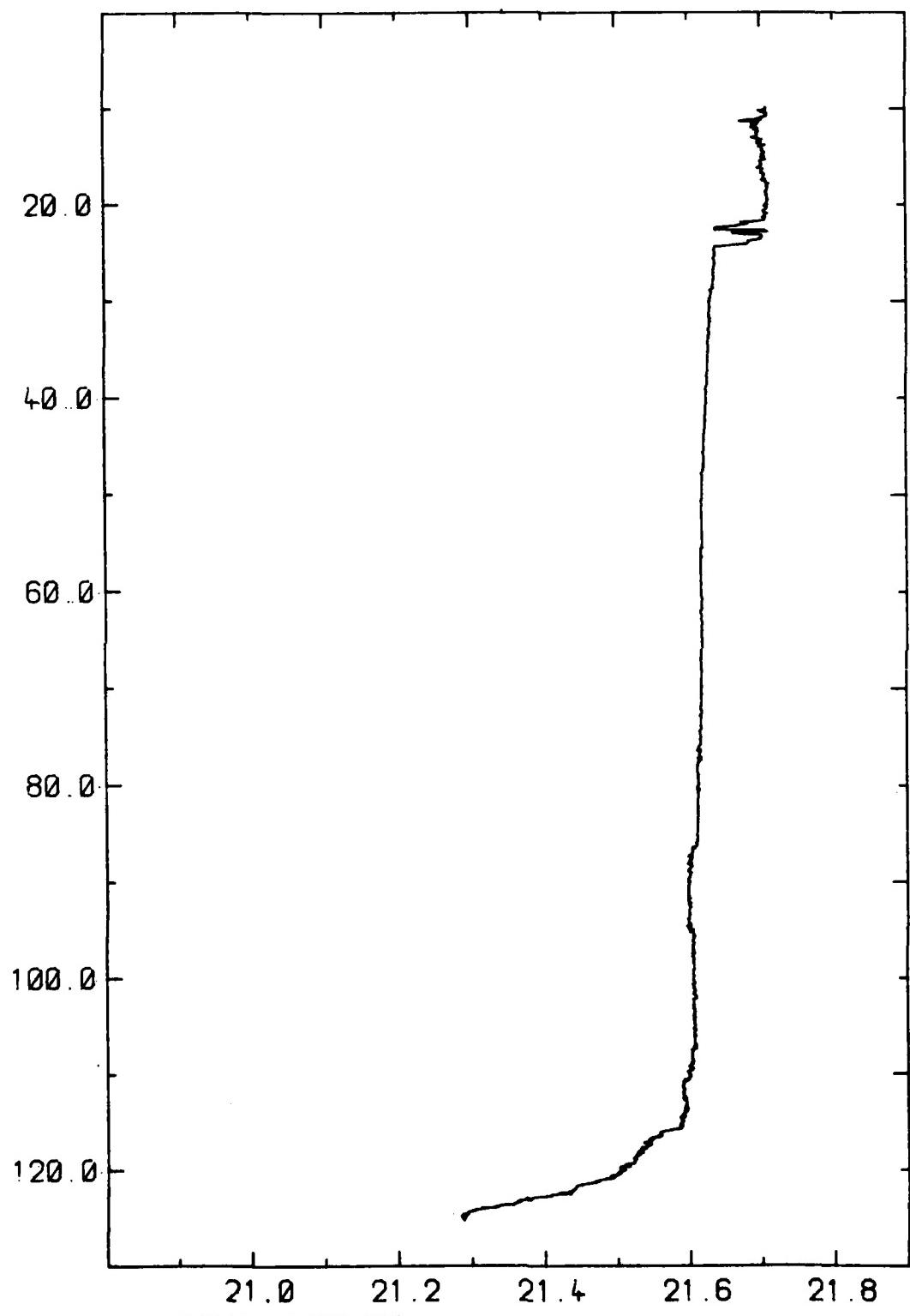
10.0 DEG/M



DATE 1/29/80
TIME 0055 GMT

114

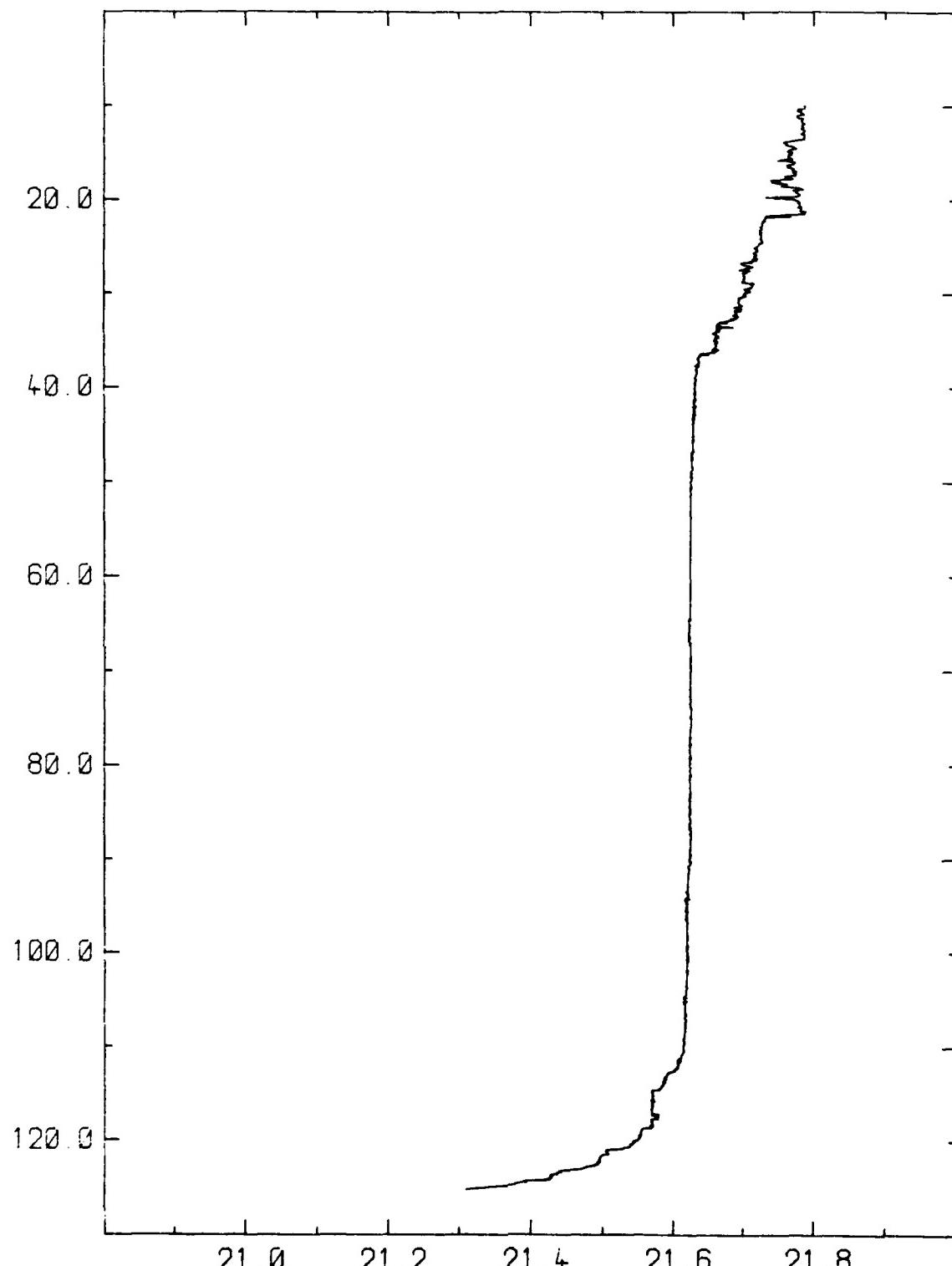
TAPE F8D FILE 1
UNIT 7.79



DATE 1/29/80
TIME 0055 GMT

TAPE F8D FILE 3
UNIT 7.79

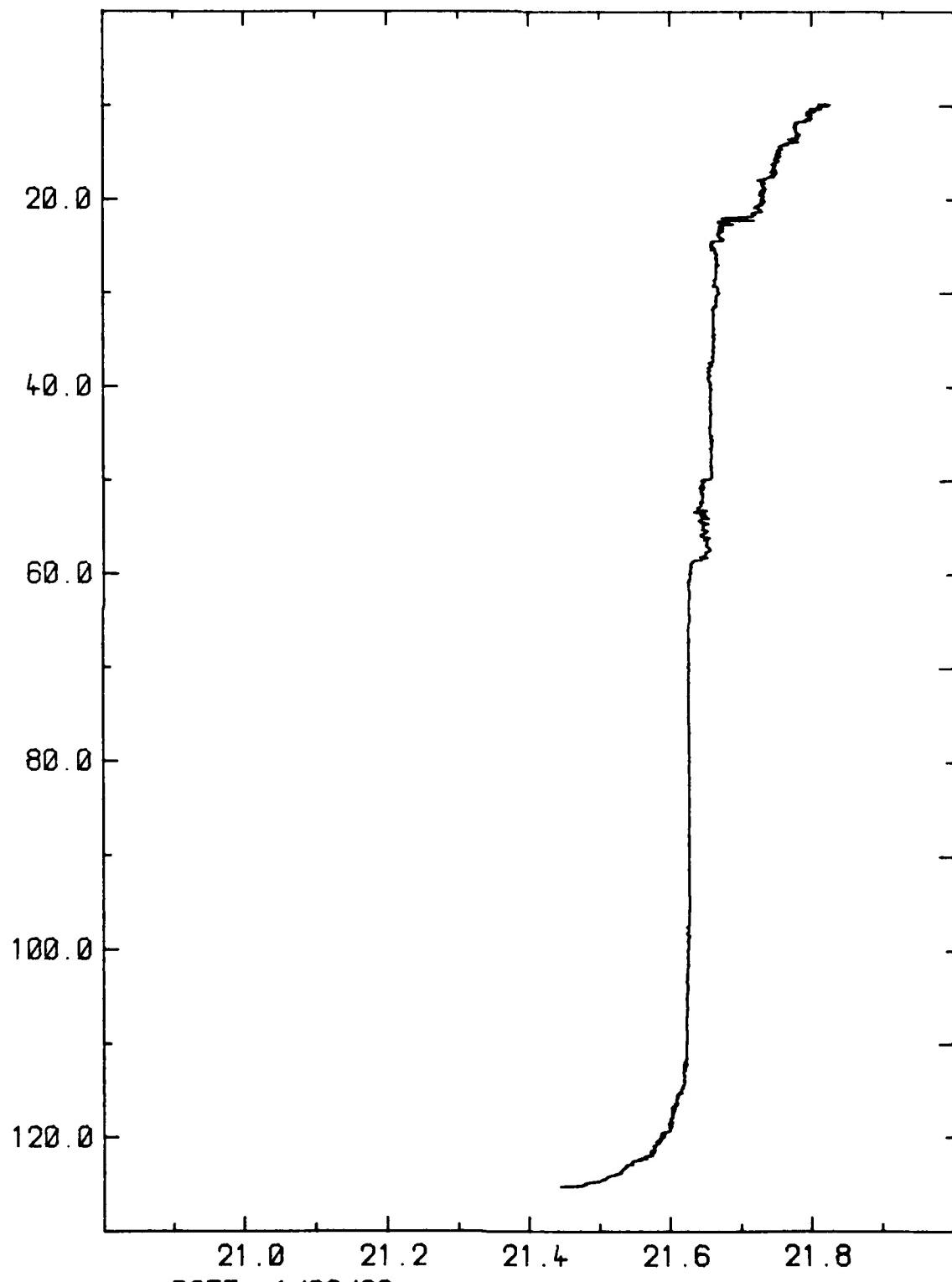
115



DATE 1/29/80
TIME 0135 GMT

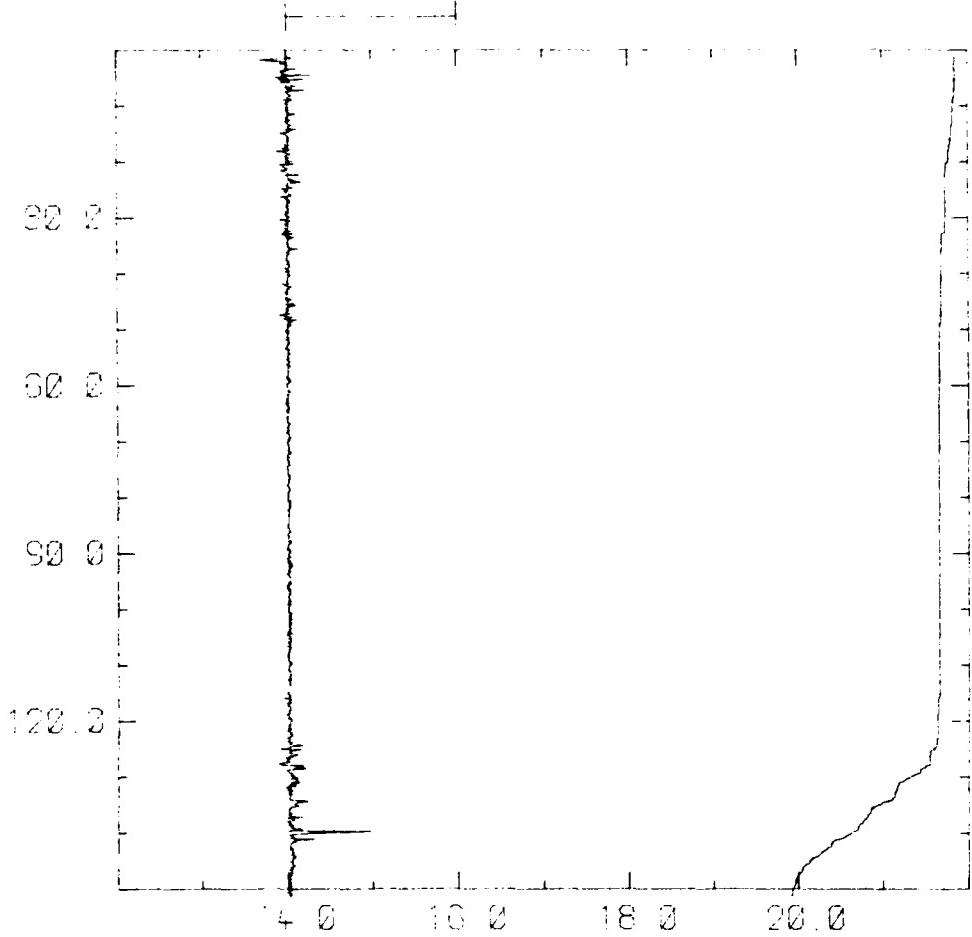
116

TAPE F8E FILE 1
UNIT 7.79



DATE 1/29/80
TIME 0209 GMT

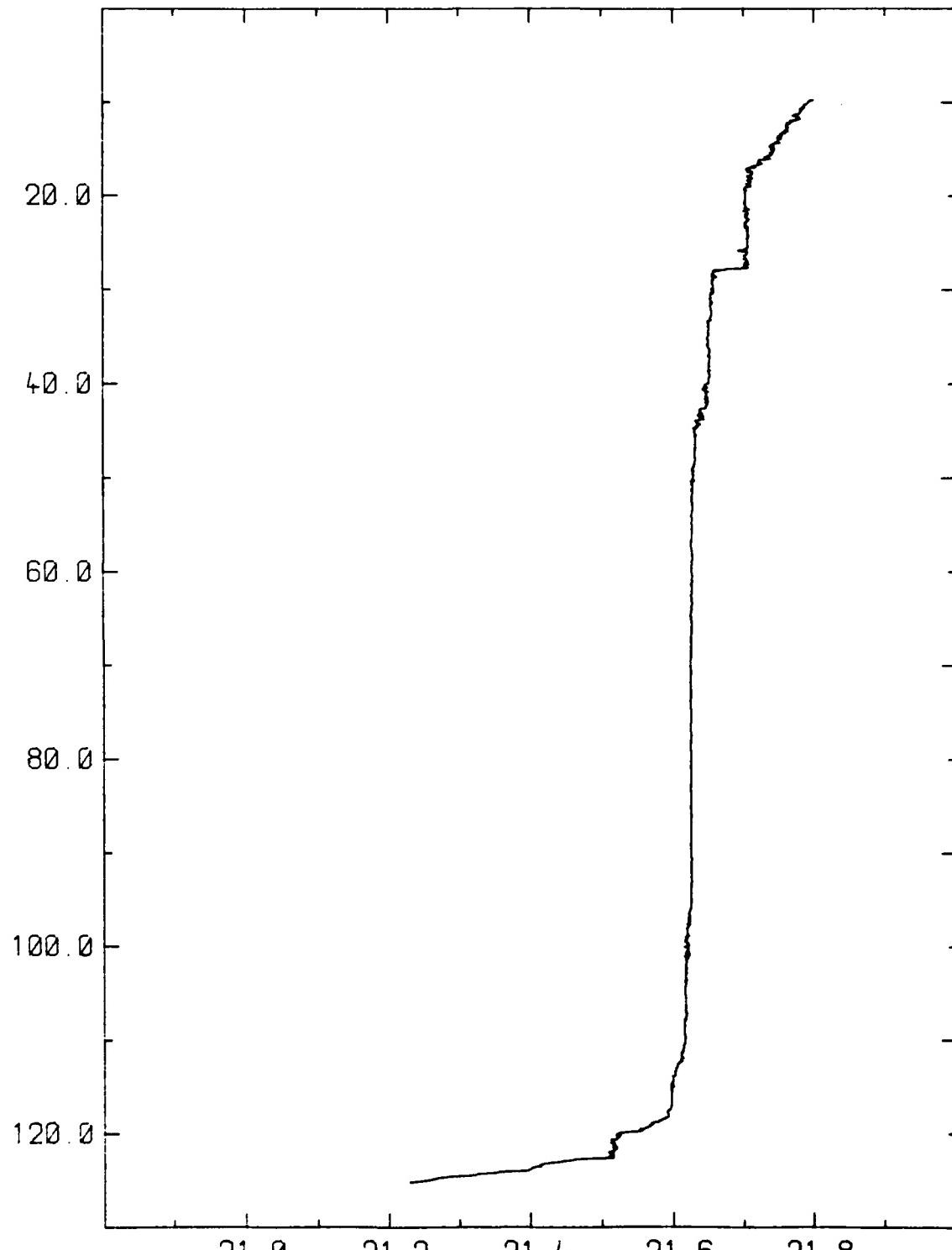
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UNIT Z 29
S P DEG/M



DATE 1/29/60
TIME 0229 GMT

118

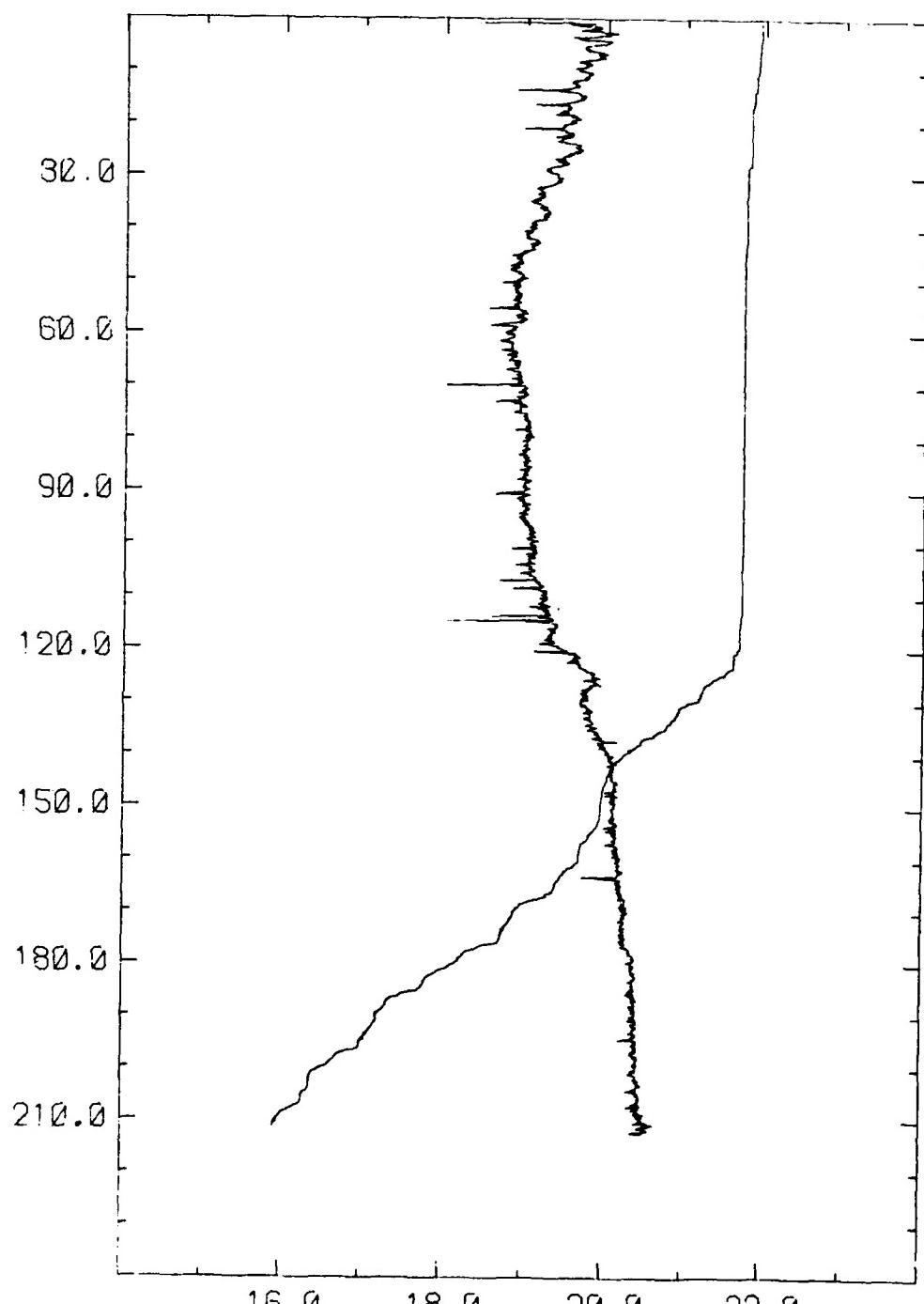
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UNIT 7.79



DATE 1/29/80
TIME 0229 GMT

TAPE F8E FILE 2
UNIT 7 79

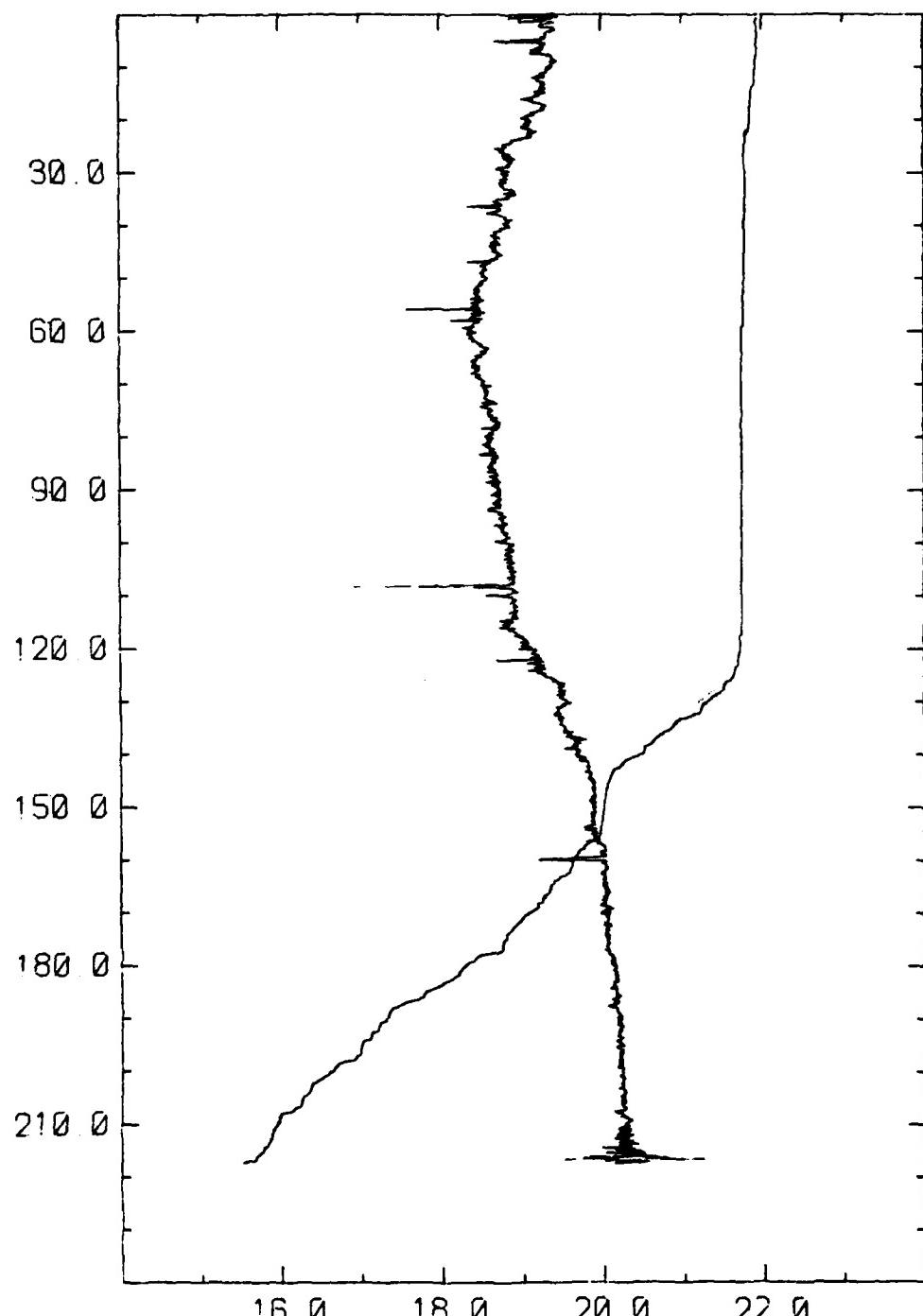
119



DATE 1/29/80
TIME 0229 GMT

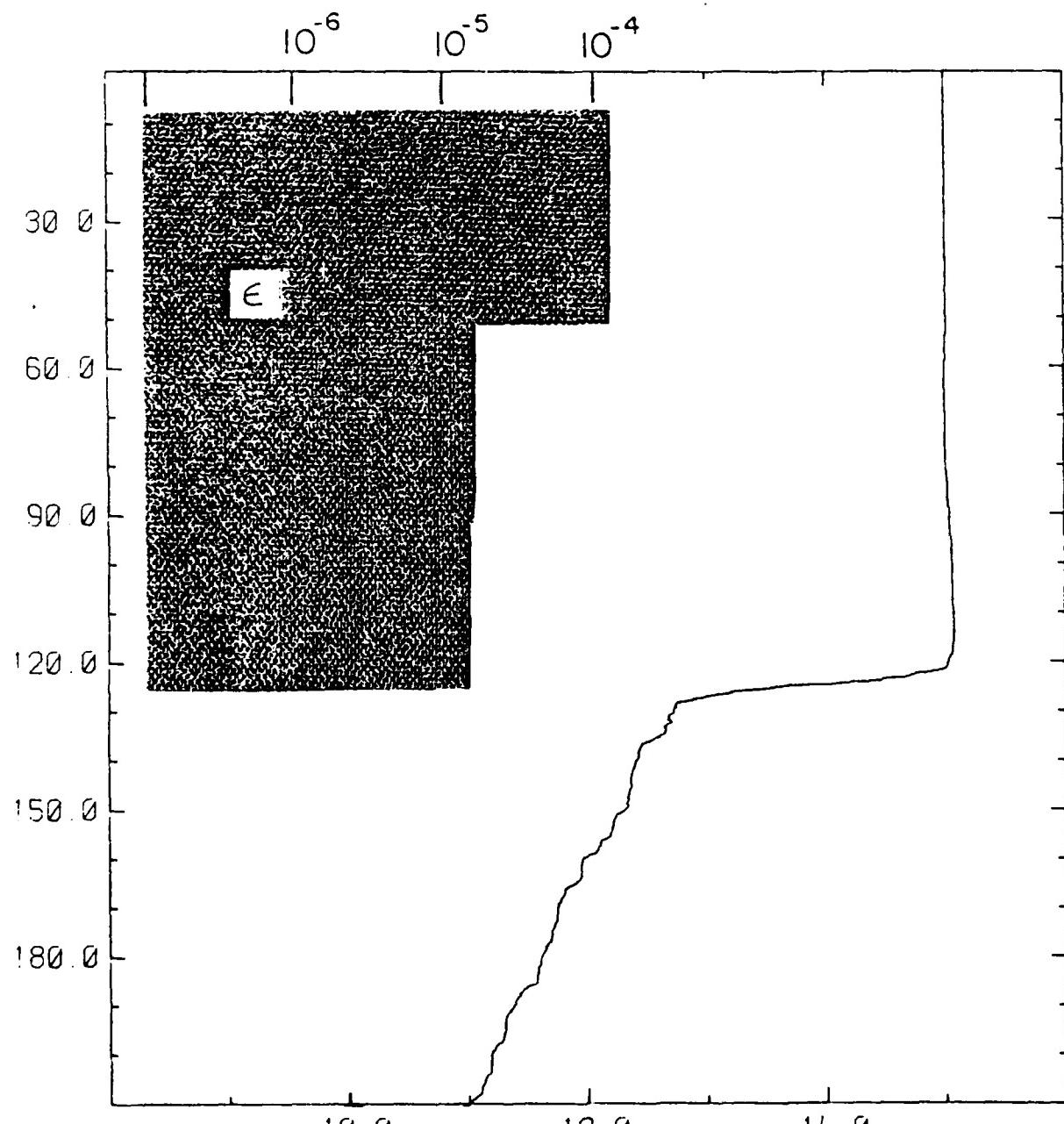
120

TAPE F8E FILE 1
UNIT 7.79



DATE 1/29/80
TIME 0209 GMT

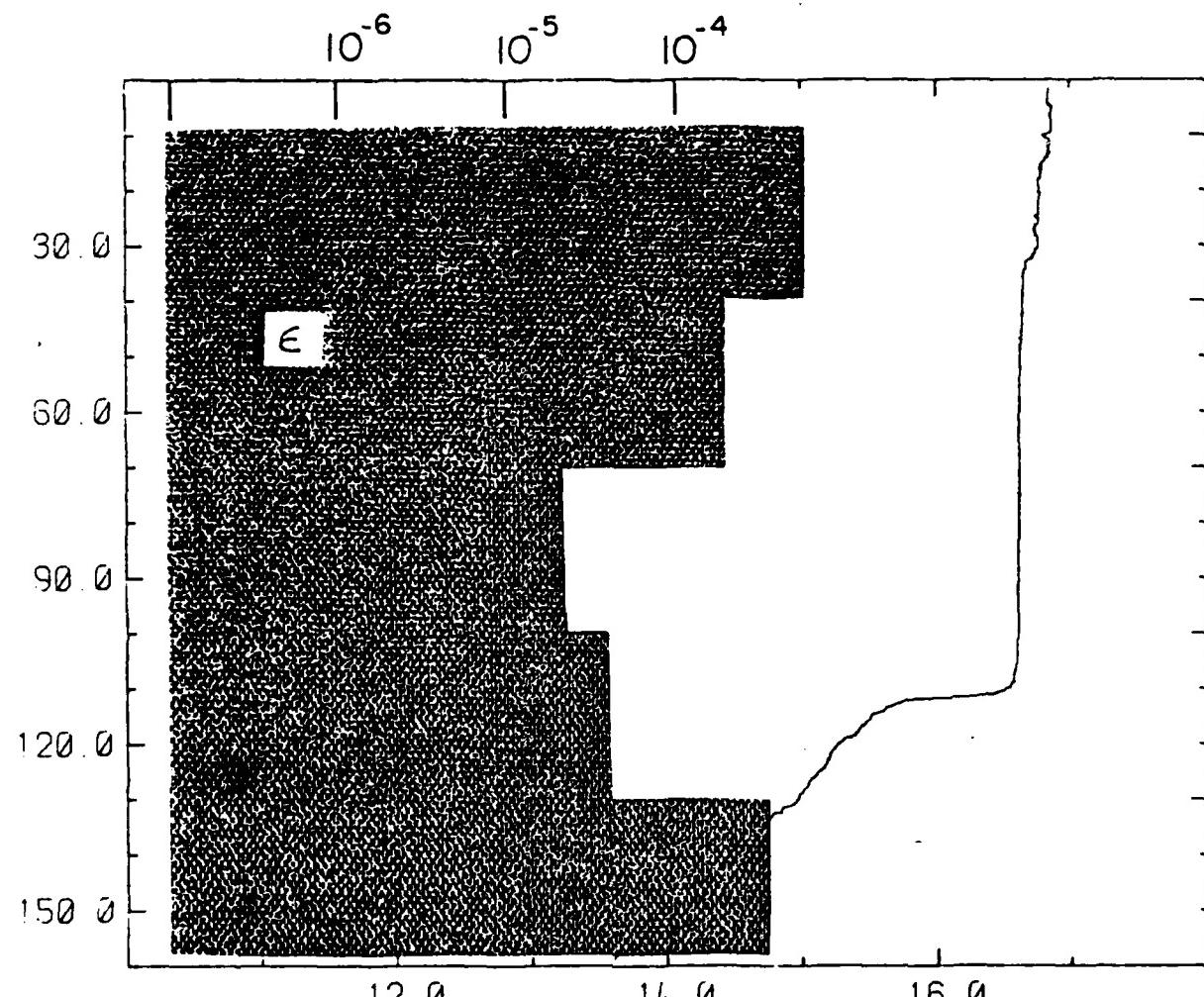
TAPE F1D FILE 2
UNIT 2.79



DATE 1/15/80
TIME 0935 GMT

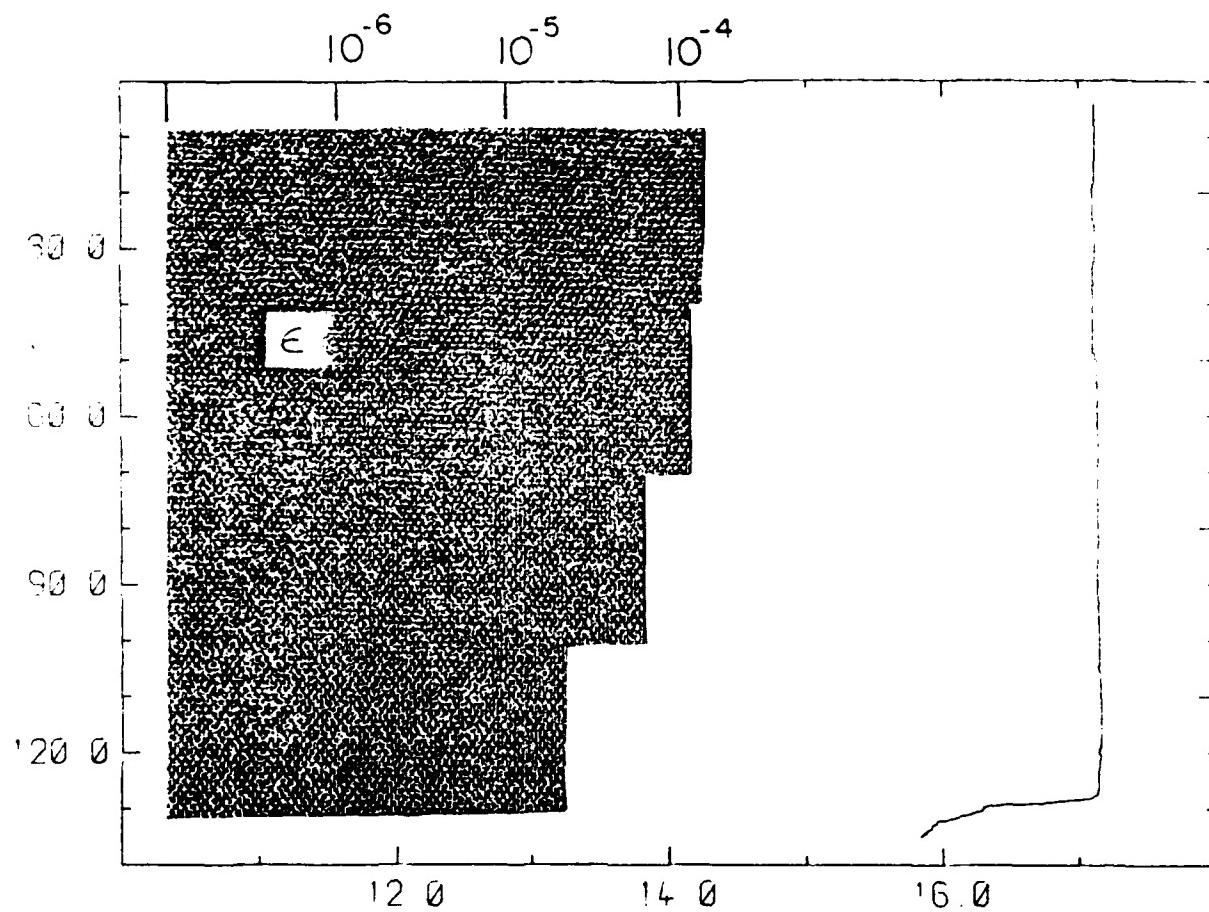
122

TAPE F2E FILE 1
UNIT 3.79



DATE 1/24/80
TIME 0124 GMT

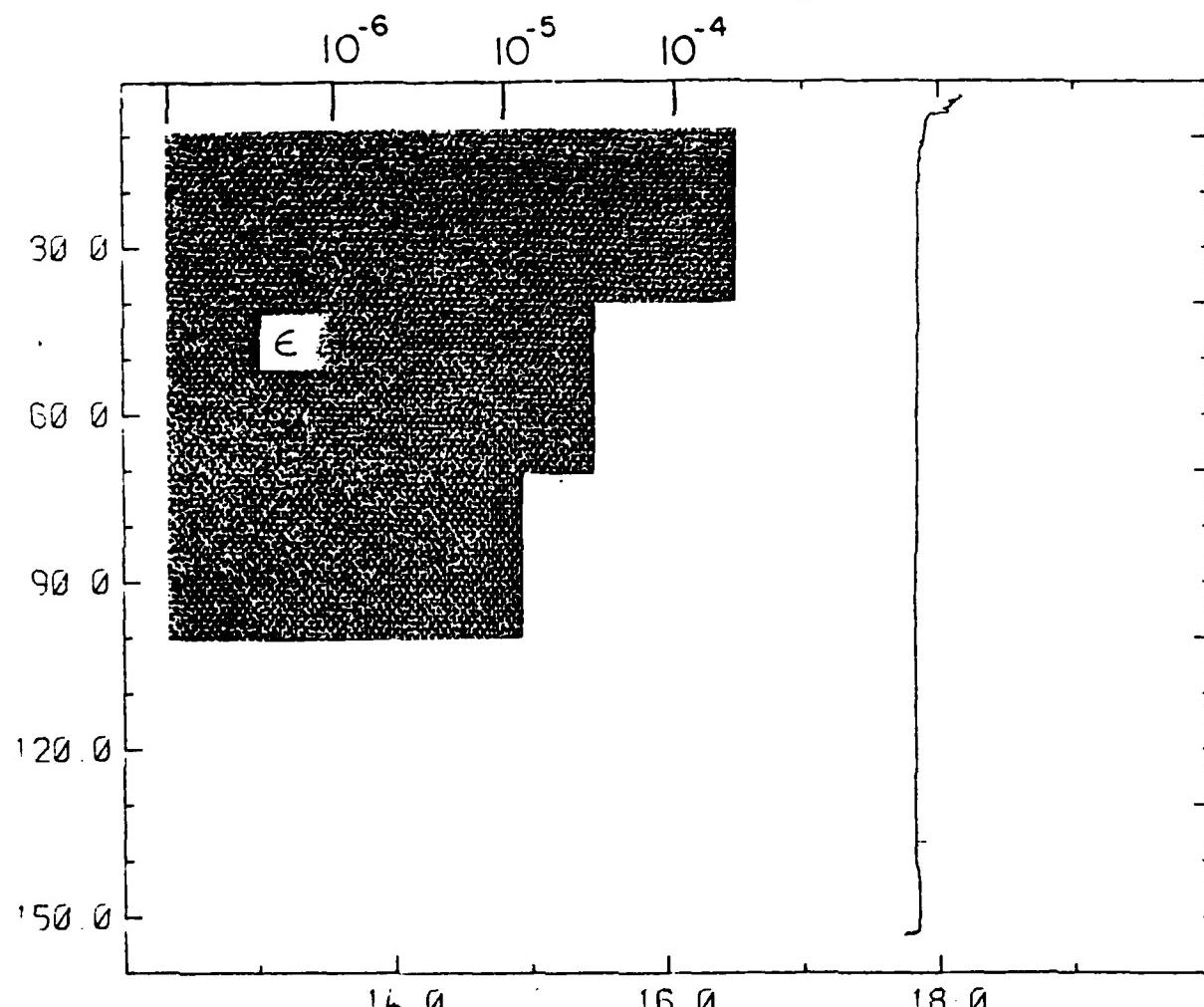
TAPE F3E FILE 1
UNIT 2 79



DATE 1/24/80
TIME 2317 GMT

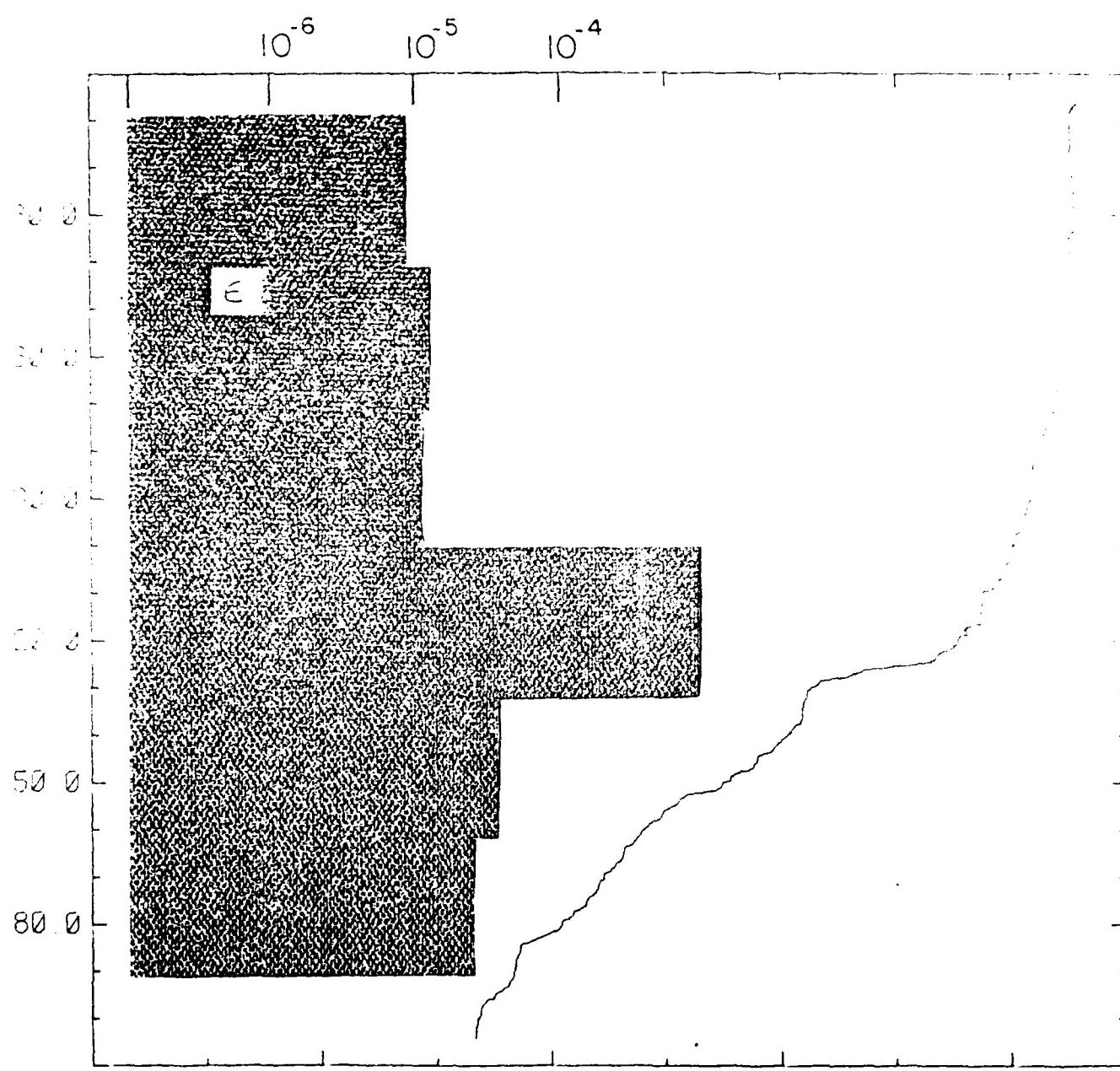
124

TAPE F5C FILE 3
UNIT 2 /79



DATE 1/26/80
TIME 0054 GMT

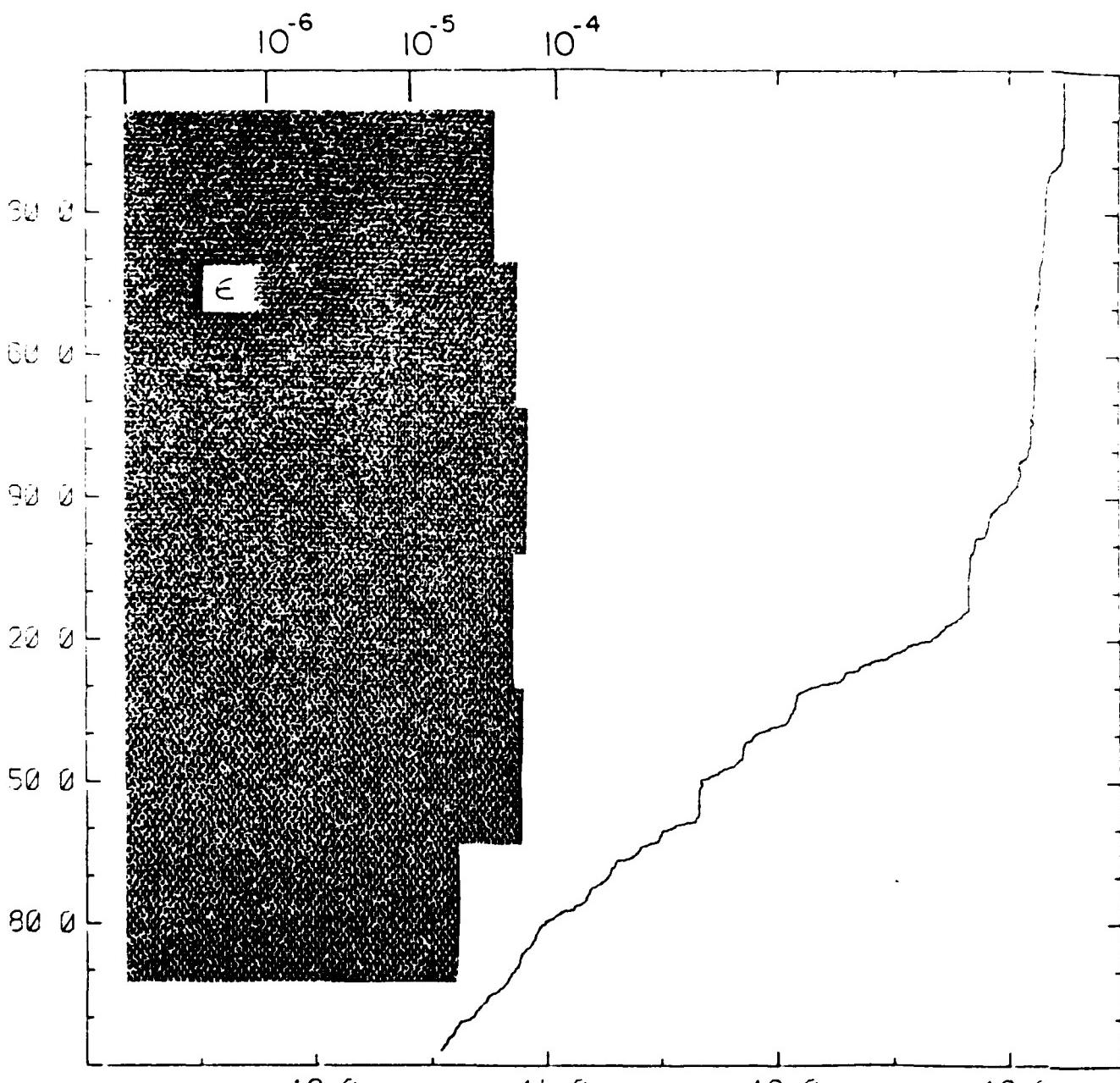
TAPE ESE FILE 2
UNIT 2 79



DATE 1/26/80
TIME 0851 GMT

126

TAPE F6B FILE 1
UNIT 2 79



DATE 1/26/80
TIME 2102 GMT

